THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—19TH YEAR. SYDNEY, SATURDAY, MAY 14, 1932. No. 20.

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The Anne MacKenzie Oration.[1]

A STUDENT UNDER LISTER.

By R. HAMILTON RUSSELL, F.R.C.S.,
Melbourne.

I DESIRE in the first place to record my thanks for the great honour (such I deem it) of being asked to deliver the Anne MacKenzie Oration for 1932.

Most frequently, on occasions such as this, the subject and the treatment of it are determined by the desire to do honour to someone who has lived and worked notably in the highways of science; the lecturer in such a case has a wide range of choice for a subject; he may treat of practically any matter he likes in any way that may seem to him appropriate. My case this evening is somewhat unusual. In coming here to do honour to Anne MacKenzie we are not called upon to extol the life and work of a great scientist, but of a woman devoted, it is true, during her lifetime to the cause of education, but whose influence found its field for all things good mainly in the domestic life of the home. Of this sufficient evidence is afforded by the filial piety which implanted in the breast of one of her children the desire to express his gratitude and do reverence to her memory in this way. Under these conditions it would at first sight appear that the choice of a subject suitable to the occasion must surely present some little difficulty. That difficulty has, however, been happily overcome by the action of Sir Colin MacKenzie in choosing my subject for me, and it is easy to understand the feelings that prompted his decision. "Let it be something first-hand about Lister" was the suggestion; for Lister is fast pass-

[1] Delivered at the Institute of Anatomy, Canberra, March 29, 1932.

ing into the legendary state that, sooner or later, must overtake all things that have life. There are comparatively few men still living who have walked and talked with and, above all, been taught by Lister; soon there will be none, and as I happen to be one of the few remaining out of the number of his pupils, it was, I think, a happy thought on the part of Sir Colin MacKenzie to make this lecture a link that will be enduring between Lister and Canberra.

May I be pardoned if I allow my fancy to roam a little? I feel that I am standing here this evening between past and present, between Lister, under whom I served as house surgeon close on half a century ago, and a house surgeon of my own of much later date, in the person of Sir Colin MacKenzie. Let me disavow at once any intention of making this a scientific deliverance.

Lister's scientific work has been so abundantly recorded that there is really nothing left to me to say that has not been already said, notably in the recent Listerian Oration delivered by Sir Charles Martin in Adelaide, wherein will be found a most illuminating account of Lister's progress along the new and winding pathways of bacteriology.

I shall endeavour to bring Lister before you in a personal, intimate way, as I remember him. I trust that, should any of my hearers ever be asked to explain what they know about Lister's title to fame, they will not make answer to the question as did a certain young lady of my acquaintance, who thought for a few moments and then said: "Lister, of course; he discovered 'Listerine', didn't he?" Where, then, to begin? Shall I begin with Lister's ponderings on the nature of the fatal diseases that attacked wounds, more especially the wounds of patients in hospitals, or shall I begin at the beginning of Lister for me? This latter course would have something to recommend it, but suppose we begin with a very few words about the beginning of Lister himself.

Joseph Lister was born in 1827, and the centenary of his birth was celebrated the wide world over five years ago, more especially in London, Edinburgh and Glasgow, the three chief seats of learning that Lister adorned during his lifetime. There were no signs and portents attending on his birth; there was not even the usual struggle of genius with poverty at any time during his life history. He was born into a large and wealthy Quaker family, of which the father, J. Jackson Lister, was at once a prosperous wine merchant and an eminent scientist who had made important contributions to the construction of the compound microscope. The microscope was his hobby, a hobby that won for him the coveted distinction of election to Fellowship of the Royal Society. Thus it is evident that Joseph Lister was born in the purple, and it is small wonder that his early scientific studies should have been, as they were, largely suggested and directed by the microscope. We may be sure that very soon, and without difficulty, he became possessed of the best microscope that money could buy, and he had the best of mentors in his father to aid and direct his early scientific endeavours. So it occasions no surprise to find that even during his studentship he was able to record important scientific studies to which the microscope supplied the means, such as the "Cutaneous Pigmentary System of the Frog", the "Contractile Tissue of the Iris", the "Muscular Tissue of the Skin"—contributions all notable at once for minuteness and accuracy of observation and reasoning, independence of thought, faithfulness and simplicity of description. Very soon we find the subjects that engage his attention are beginning to assume a character of more direct clinical significance; and with researches on the early stages of inflammation, and the Croonian Lectures on the coagulation of the blood, we become conscious of the first steps along the path of scientific study that will eventually lead him to the great achievement of his life.

And now I will delay no longer in coming to the beginning of Lister for me. The scene is the operation theatre of King's College Hospital in the year 1878, and a gathering of onlookers had come to see Mr. Lister cut for stone in what is now an entirely obsolete fashion. There were rapidly approaching footsteps resounding in the corridor, the door was flung open, and a splendid looking man, accompanied by a staff of assistants, entered the theatre and proceeded with the work in hand. I shall never forget my first sight of Lister; I had been well schooled in the knowledge that he was a very great surgeon, one destined in course of time to be recognized as among the greatest, in all probability, that have ever lived. It was thought by many that he would revolutionize surgery; others again would have none of it. It was the senior men, men older or contemporary with him, who found especial difficulty in accepting his theory; with the younger men it was not so. I have the greatest sympathy with the seniors of that time; their position was most difficult; they were as one on the horns of a dilemma. They had either to set to work and learn an entirely new kind of surgery, with all the old guiding principles flung to the winds, or they might try, as best they could, to carry out the new methods without any preliminary training, without even any strong convictions to assist them in understanding the new principles of Lister and the new methods that they involved.

The operation we had come to see was finished in due course, and then I joined the band that accompanied Mr. Lister to the wards; and here was witnessed a wonderful thing, which I was far too inexperienced to understand. Lister dressed a case that he had operated on a few days before, for a large collection of matter (perhaps a pint or more) resulting from a diseased spine. The operation consisted merely in evacuating the collection of matter through an incision in a suitable spot and putting in a rubber drainage tube. That sounds very simple; and it was perhaps the simplest operation in surgery; but as to its effects, there was nothing in the entire range of surgery more dangerous to life than

the opening of this large abscess and allowing the matter to escape. What would happen would be this. A day or two after this simple surgical procedure the patient, who had hitherto been quite well, or at any rate had been suffering only very slight signs of ill-health, would suddenly become very ill. High fever would set in, together with a great increase in the discharges from the large cavity of the abscess, and this state of affairs once established, surgical skill would be powerless. In a few weeks or months attended by rapid wasting, he would die from exhaustion which had clearly dated from the incision into the abscess and the evacuation of the matter. And this is where Lister came in with entirely new knowledge. He had found out, mainly through study of the writings of Pasteur, the cause of the terrible results supervening on the opening of the large spinal abscess, of the fever and the wasting and death. This was all caused by the presence of germs, which were practically everywhere. The germs having gained access to the interior of the cavity, brought about decomposition of the fluids, which then became virulently poisonous and irritating. Lister's problem was to get rid of the matter without admitting the living germs to the interior of the cavity, and this was what he was about now. The patient was a young man, and it was four days since the operation; the dressing had been changed daily, and the clear, thin, odourless discharge that was coming away, was rapidly diminishing in quantity. The temperature chart showed no fever, and the general condition was excellent. The changing of the dressing was a wonderful ceremony. It was carried out, as the operation had been, in a mist of carbolic acid and steam generated by a steam spray. The outer bandages having been removed, the spray was set going, the main dressing of gauze with a covering of "jaconette" cautiously turned down (but not yet to be removed), the drainage tube taken out and a wet carbolic rag quickly laid over the site of the tube, while certain other steps were carried out with meticulous care. Thus the tube was replaced after being held for a few seconds in the spray, with the idea of making sure that none but carbolized air should be introduced by means of the tube. The area of skin in the neighbourhod of the wound had to be washed over at each dressing; then the wet layer of carbolic was placed next the wound, then an abundant mass of dry carbolized gauze, and then the large gauze and mackintosh dressing was applied lightly over all. Next, a length of elastic webbing was put on in such a way as to keep the edges of the dressing in contact with the body, so as to prevent any unpurified air from being sucked in under the dressing. Finally, certain safety pins, of which each had its sentinel-like duty in preventing any possible shifting of the dressing. I do not expect to make the procedure very intelligible to you; but just imagine what it must have been like to Lister's philanthropic soul to find that he was able to protect his patients from the fatal ills I have described, and to find, moreover, that he was able to preserve this happy condition in wounds for an unlimited period. As the discharge from the abscess diminished day by day, the changing of the dressings became more and more infrequent. Shortly, the interval between the dressings could be extended to forty-eight hours, then to three days, four days, eventually a week, and a week was the limit allowed; and it would be once a week for many months. The total period under treatment would often be from one to two years, but during this wearisome period the patient, instead of wasting miserably to death, suffered no ill-health whatever and became plump and fat.

And here let me digress a moment to remind you of something I may have to allude to again. It is this. When we sometimes see wonderful results being achieved by Lister, it does not always follow that his methods are such as should be exactly followed at the present day. A good case in point is afforded by the somewhat spectacular carbolic spray. This was the most striking of his surgical appliances; it was in reality the least important. Its rationale was, of course, to purify the air by killing microbes floating on the dust of the air. At the time I am speaking of, Lister thought there was great danger to a wound in allowing unpurified air to come into contact with it. We must, however, remember that the science of bacteriology had hardly come into being; germs were just "germs of putrefaction", whether in the air or elsewhere. Lister could not know at this early period that the germs that were floating about in the air were, by their nature and by their sparseness of distribution, harmless to surgical wounds. That knowledge came later, and then Lister, with some natural misgivings, gave up the spray.

Again, what of our spinal abscess? Advancing knowledge has taught us that there are better ways of dealing with a spinal abscess than by opening and draining it, and that it is possible to get rid of the yellow matter without opening the cavity widely and letting in any germs. What we talk so glibly about nowadays as T.B. (tubercle bacillus) in those days had not been discovered, and Lister was unaware of the difference between a tuberculous collection of "matter" and any other abscess. That being so, however, does not in the least alter the fact nor the significance of his immense achievement in draining and dressing a large spinal "abscess" during many months, preserving a condition of asepsis from beginning to end under a dressing changed only once a week. Being once in possession of a principle and a method that enabled him to accomplish this, meant that he could apply this method with confidence in any other surgical condition in which the skin was unbroken. It meant also that he was in possession of an entirely novel principle of immense significance which conferred on him the power of reviewing the prospects of almost any and every kind of surgical case by the light of his own handiwork alone. The visible result of this was that he always seemed to be performing operations that were new; and in discussing a

case he would first carefully present the position as determined by the recognized existing laws of surgery; and then would come the saving clause: "But now that we are able to conduct the operation antiseptically, it is clear that the chief dangers of surgical interference are taken away." Let me try to make plain to you the story of one such case. Dame Nature's little mistakes provide the surgeon with a considerable portion of his work; such a mistake sometimes takes the form of miscounting the ribs, making one rib too many, and that placed in a situation in which it is of the utmost importance that no rib should be. Thus it may be a small rib deep-seated in the neck behind the collar-bone, where it may interfere with the great nerves going to the arm, with crippling effect. No surgeon would have dreamed in those days of cutting down into this dangerous region, owing to the fear of inflammation spreading downwards into the chest, which would be certainly fatal.

A poor man came to Lister after having sought, without avail, relief from his sufferings at various hospitals; he had what appeared as a mass of bone deep-seated in the neck, with great pain and weakness of the arm, which rendered labouring work impossible. Nobody thought of it being a rib; but that did not really matter; the point was that nobody dared to risk the fatal inflammation that would almost certainly follow upon any attempt to remove the lump. Lister not only dared to take the risk, but was confident that he could do it with safety. It seemed, so far as one could tell, a bony outgrowth, probably attached to the first rib, and such it was called. The operation was devised and carried out with complete success. I can vividly recollect Lister, after the patient had been taken back to the ward, standing in the middle of the area curiously inspecting the bony growth he had just removed, saying: "Now that we come to inspect the growth visually, it appears to be of a somewhat different nature from what we expected; it appears to be a small rib, evidently a supernumerary rib."

Since that day the correct diagnosis and removal of cervical (neck) ribs has become a commonplace of surgery. We have no longer any difficulty in diagnosis; the X rays see to that. But it is more than likely that the recognition of the frequency with which cervical ribs make their appearance would, but for Lister, have had to wait for the coming of the X rays; and even then no man would have ventured on an operation for their removal but for the assurance of safety conferred by Lister's work.

Lister was entirely unlike any other surgeon, and to work with him was quite a different experience from that of working with any other surgeon; and the reason? Lister was the greatest dresser of wounds the world has ever seen; so great indeed in this department of surgery that there seemed to be little time for anything else. It is true that he taught a certain amount of what I may call text book surgery at his clinical lectures, delivered twice weekly for an hour, and very perfect and priceless lectures they were. Nevertheless, it was really at the bedside that Lister laid the foundation of the immortality that is his.

I have estimated that, at a modest computation, his teaching consisted habitually of 75% dressing of wounds, and the remainder of surgery in the ordinary sense; and the whole art of wound dressing, as he taught it, had been built up by himself. He had no predecessor upon whose foundations he builded; no successor on whose shoulders his mantle descended. I say this without derogating in the least from the value of the services rendered by his distinguished pupil and first lieutenant, Sir Watson Cheyne, who was also one of my teachers. I must add a few words here on the healing of wounds in general and the effect of Lister's methods in that important department of surgery. Most of you, certainly any who have attended a first-aid class, will be aware of what is meant by healing of wounds by first intention and by second intention. Healing by first intention takes place when a wound is accurately closed by stitching and remains uncontaminated by germs; the time required for healing will then be three to four days. By second intention we mean that the edges of the wound have not been brought together, or that inflammation of the wound has occurred, so that the healing has had to take place from the bottom of the wound, a process that will take as many weeks as the other will take days. And now there is a third kind of healing of which you have never even heard, that which takes place when the wound is free from germs, but is not brought together and, therefore, cannot heal by first intention. In this case the gaping wound fills up with blood clot, but as there are no germs the blood clot does not break down and discharge, but remains apparently unchanged day after day. I say apparently unchanged, because all this time the clot will be undergoing invasion by cells and blood vessels from the sides, becoming, as we say, organized, so that eventually healing will be accomplished in this way. We must then add to our methods of healing by first and second intention, a third, which is called healing by organization of blood clot; and this we may call Lister's own. In Lister's practice this phenomenon was frequently observed; it is entirely forgotten and unknown now.

A very characteristic story is that of his attendance on a patient so exalted in rank that the mere mention of an operation would have disturbed all the chancelleries of Europe; for the patient was none other than Her Majesty Queen Victoria. At this distance of time, it would seem that professional secrecy may be disregarded in favour of historical accuracy, and I assume permission to mention that Her Majesty suffered from a very painful abscess under the arm, which required to be opened and drained. This was done, but at first the drainage, which was carried out by the insertion of a strip of lint, was not acting well. The matter was not escaping with sufficient freedom, the temperature remained high and things were unsatisfactory. Walking in the garden, pondering deeply over the surgical problem occupying his mind, he suddenly bethought himself of the use of rubber tubing which had at some time previously been suggested by the French surgeon, Chassaignac. But he had no

rubber tubing. Oh! Yes, there was some tubing attached to the spray producer. He cut off a suitable length of this and inserted it into the abscess cavity and "happed up" the seat of operation as he alone knew how; as a result he was relieved to find that the pain and fever at once disappeared, and all went well thenceforward. From that day the rubber tube figured in practically all Lister's operations; but how many among those with whom it has become familiar, suspect that its origin was so closely touched with royal romance.

Another amusing story comes from the same source and used to be told by Lister at the appropriate moment with a great show of humorous secrecy. I must recall what I said some time back about Lister's methods of surgical dressing and the use he was wont to make of safety-pins in affixing the dressing so securely that it could not shift its position in a week. As I expressed it, I think, each safety-pin had a sentinel-like job, and not one could be spared or altered in position without a danger of the whole shifting and exposing the wound to the risk of contamination. The story relates that one day Lister was driving away from the castle after tending the royal patient, when suddenly a dreadful doubt assailed him in the way such doubts do sometimes; he could not remember putting in a certain very important safety-pin, and the more he thought of it the more convinced he became that the particular pin had been omitted. What was to be done? Presumably he did some very hard thinking concentrated into a very short time. The end of it was that the carriage was turned round and due confession made to the occupant of the most exalted throne on earth, that he had been so careless *et cetera*. Somehow I could never persuade myself that the self-abasement was quite so deep as he would have had us believe.

And now I am going to shift the scene somewhat; I have endeavoured to depict Lister engaged in the work which has made him just what he is and will always be. But he had another pet activity of a most singular nature, curiously unlike that we have been describing and yet equally closely concerned with the practice of surgery. You will hardly believe me when I say it—the administration of chloroform. Lister had become infected with a special interest in this subject through association with his father-in-law, Syme, of Edinburgh; both of them held views as to the proper method of administering chloroform, views which were in violent conflict with those held by practically all physiologists and administrators. One obvious but strange result of this is to be found in the fact that Lister would not allow anybody holding what may be called orthodox views on the subject, to give anæsthetics for him. On the other hand, it was of the utmost importance from his viewpoint that he should teach his students to give chloroform in his way and in no other. Accordingly, the chloroform was always given by one of his dressers, the arrangement being that each senior dresser (of whom there were three called clerks) should give chloroform for two months during the half year. The entire responsibility was taken by Lister, and he was the sole teacher and referee. On the day the new dressers and clerks came on duty for the first time, Lister would spend an hour or more explaining thoroughly his method and principles. They were very simple.

(1) First of all came the great basic principle that the chloroform vapour must be freely diluted with air. This was easy and was secured by the artifice of using the corner of a towel as an inhaler which could not fit so close over the patient's face as to exclude free play of air.

(2) The adequate mixture of chloroform vapour with air thus assured, it was a mere matter of experiment to find out what happens in the case of a dangerous dose of chloroform; it is found that in such a case the breathing is always the first to stop, not the heart and the pulse. From this consideration there would arise inevitably the second rule that the administrator should disregard the pulse and concentrate all his faculties on the breathing, and even this is not always easy. It is quite possible to overlook the fact that the air passages have become obstructed so that the chest will go on heaving although no air is able to enter. But this is happily not likely to occur. Once this is shown to a learner he is not likely to fail so grossly; and Lister would be at great pains to illustrate the movements of the chest, first with a free airway through the larynx and then with obstruction of various degrees, from slight stertor to complete obstruction.

I have always marvelled at Lister's courage in teaching his students in this way. It meant that every two months he had a new and inexperienced chloroformist for whose doings he shouldered the responsibility; and people vary considerably in the facility they display in learning a new procedure. I have tried to double the parts of operator and teacher of chloroform administration in this way, but I came to the conclusion that I lacked courage for the undertaking of the two things simultaneously. But Lister did it habitually, and I am inclined to think that, of the many things about him that were wonderful, I should give this a good place.

We seem to have better anæsthetics for the majority of purposes nowadays; chloroform seems to have almost sunk into abeyance, almost, but not quite. Moreover, you never can tell when any outside piece of apparently fruitless knowledge is going to prove suddenly of unexpected value.

Some years ago I had as my house surgeon at the Alfred Hospital a young fellow who became very much interested in my description of Lister's way of administering chloroform. Would I show him how it was done? Of course I would be delighted to show him, and I did, so that he speedily became a very capable and safe administrator, and there, so far as I had any reason to suppose, the matter ended. But it is, as I have observed, a thing almost unknown for any definite piece of knowledge of any kind to fail to come to the front sooner or later, if we only wait long enough. In this case my young house surgeon, Dr. McDonald, did not have to wait long. The outbreak of the Great War found him in England. He joined the Royal Army Medical Corps and was appointed radiologist

to a large stationary hospital in France, with the rank of captain. It was not long before the advent of trouble. The supply of ether gave out, so that the military surgeons had to fall back on chloroform. But the administration of chloroform had not been taught, and chloroform had been generally condemned as a thing to be avoided. To make a long story short, the highly competent medical men on the staff of the hospital were at a loss when it came to administering chloroform. Under these circumstances serious troubles were unavoidable. When things were about at their worst, it happened one day that there was a chloroformist short and the radiologist was required to give the anæsthetic for several cases. The result was such as to create astonishment. All the cases took the anæsthetic without any trouble, and the questions presented to Captain McDonald were: "How is it done?" and "Where did you get it from?" The next morning the entire medical staff of the hospital was paraded by the Officer Commanding, and Captain McDonald was created "Director of Anæsthetics" and ordered to organize the study of the Listerian method of giving chloroform by the entire staff of the hospital. It is pleasant to know that all concerned entered upon the job with the utmost friendliness and good humour.

It is a curious circumstance that even so lately as 1883, when the third edition of Holmes's great "System of Surgery" was published, Lister contributed two articles under the respective headings of "Anæsthetics" and "Amputation". Not a word about antiseptic surgery, but the article on anæsthetics is by many considered the best article ever written on the subject.

And now I feel that if I have succeeded in making the subject of the slightest interest so far, you will be expecting something about the character of the man, and in truth there is much to be said. There was nothing of the ascetic about Lister. He was in no wise insensible of the good things of life, and he enjoyed dispensing generous hospitality. For us, his hospital staff of house surgeons, clerks and dressers, wonderful memories belong to the occasions on which we were bidden in a body to dinner. This always happened once at the end of the six months' term of our several appointments. Lady Lister would usually be the only lady present, and the conversation, of which there would be plenty, was invariably "shop", naked and unashamed. But it was such shop, and it lasted continuously all through an exquisite repast until the time came for migrating to the drawing room; and then there was more "shop". Did we realize our privilege, its rarity and picturesqueness, we who were sitting round Lister's table and chattering to him like schoolboys? Yes, I think we did. I think we quite realized that the time was near when any words that came from Lister's lips would be more highly regarded a thousand times than the notes of a *prima donna*. Yet withal he was deeply and unaffectedly devout. His simple child-like faith was apparently untroubled by scientific questionings, and there was in his mind no need for any conflict between science and religion; still less could there be rivalry or even a line of separation between the worship of his maker and the service of his fellow men. Everything that was truth was sacred, no matter whence it came or in what guise. He loved his fellow man first, and said so; and one believed him, which was perhaps the strangest thing of all. Other people, if they go about saying they love their fellow men, are apt to be doubted, but nobody ever doubted Lister, for reasons that were self-evident. With him the profession of healing very definitely surpassed all others, and he never permitted any doubt as to that. Thus I once heard him remonstrate in the operating theatre with some onlookers who were talking while he was operating. Turning to them, he said with slight, but unmistakable emphasis: "Gentlemen, this place is holy, more so than any church; silence, if you please." Often, in listening to Lister, would come what I was accustomed to call "great moments"; a few words, a single phrase that would slip from him almost unconsciously, but that one knew was burnt into one's own mind to be effaced only by death. Here is one such that has always seemed to me the most moving, as its memory has been most treasured. Lister, it need not be said, was a lover of children, and the subject of the lecture was a little child. After discussing the prospects of an operation, he went on somewhat as follows: "We must remember that when the patient is a child our responsibilities are rendered all the heavier by that fact. An adult has the power of deciding whether he will submit to any course we may propose or decline it. He can thus share with us some at least of our responsibility. But children are powerless in our hands, and this should make us all the more cautious in anything we undertake to do to their sacred little bodies."

And now it is fitting that this address, which had its origin in the desire to do honour to the memory of a noble woman, should end with a tribute to another. Lister was, I rejoice to believe, a very happy man, happy in his work and in the enjoyment of domestic sympathy and peace. The world, in honouring him, will never know its debt to his gentle, loving wife for her share in the laying of the foundations of modern surgery. Those, however, who are able to remember her, will know very well indeed that an account of Lister and his work would be gravely wanting were not a humble tribute of gratitude offered to her memory. As for myself, I offer you these lines of William Watson:

> 'Tis human fortune's happiest height to be
> A spirit melodious, lucid, poised and whole;
> Second in order of felicity
> I hold it to have walked with such a soul.

SPINAL ANÆSTHESIA.[1]

By ARTHUR E. BROWN, M.B., B.Ch. (Cantab.), F.R.A.C.S.,
Colac, Victoria.

I HAVE chosen to read a paper on this subject because it is one that has always interested me, and also because it is one which must necessarily be of considerable interest to anyone who has to undertake abdominal operations in conditions under which the expensive modern equipment of the large

1 Read at a meeting of the Victorian Branch of the British Medical Association at Geelong on March 19, 1932.

hospital does not exist. The advantages of such a method of anæsthesia are obvious, so much so that it is equally obvious that grave disadvantages must also exist. Otherwise so easy and comfortable a method of painless operating would never have had the long, hard, uphill struggle it has had to gain a place among the routine anæsthetics. I was house surgeon in University College Hospital, London, in the days when Barker was first endeavouring to introduce it to England. We used to do a large number of our emergency abdominal operations with it, and on the whole had very little trouble, using "Stovaine" in the heavy glucose solution; but none the less, not many of the house surgeons and students of that day carried out into their practices much enthusiasm for it. In the King George V Hospital in London during the war, it was only with considerable difficulty that I was able to persuade surgeons to let me use "Stovaine" spinal anæsthesia; and I did not succeed in arousing their faith in it. In the last twelve years I have used it in many cases in my work, and I think I may claim to have a reasonably good bird's eye view of the drawbacks and the advantages of the method, at any rate as applied to its use by the country surgeon. Many of its disadvantages have been overcome or lessened with research and the production of new methods and new technique, but enough still remain to make its general adoption a slow process. I am not going to quote you statistics or references in the literature. In fact, I have deliberately refrained from using books of reference and journals during the preparation of this paper. I prefer to speak entirely from my own experience of spinal anæsthesia in general surgical practice in a country district. Those who wish to refer to a large hospital experience of it will find a very fair and unbiased article on the subject by McKittrick and others in *Surgery, Gynecology and Obstetrics*, Volume LII.

The advantages of a "good case" of spinal anæsthesia do not need any stressing. It is an easy and comfortable administration. No separate anæsthetist is necessary. Perfect relaxation of the abdominal wall is obtained. And a very peaceful ease in operating and a very comfortable immediate post-operative course for the patient are achieved. The disadvantage of the method lies in the uncertainty that all these benefits will be obtained in any given case. The giving of a constant known dose of a stable drug, whose action is well known, by a standard technique into the spinal theca, ought, on the face of it, to be attended by results far more uniform than those of the administration of an inhalation drug in varying amount and varying concentration. And so indeed it probably is. But whereas with an inhalation anæsthetic the degree and strength of the anæsthesia are controllable at any moment during the administration, with spinal, as with rectal anæsthetics, the whole must be given at once, and all factors, such as duration, level and depth of anæsthesia, are thereafter uncontrollable.

The Disadvantages.

The uncertainty as to results lies in three main directions: First, as to the level and the duration of the anæsthesia; second, as to the emotional response of the patient to the strain of consciousness during the operation; and third, as to the vasomotor response of the patient to the procedure. The question of after-effects also arises, but this is not nearly as important nowadays as it used to be. A wide variation in any of these three factors in an unfavourable direction can make the operation the reverse of peaceful and pleasant; and it is towards the elimination of these variations that modern research has been mainly directed. Of actual evil after-effects there should nowadays be none. Since giving up "Stovaine" in favour of "Novocain", since making the use of a finer bore needle obligatory, and since adopting the practice of withdrawing an amount of cerebro-spinal fluid equal to the amount injected with the anæsthetic, I have not met the distressing and intractable headaches and backaches which I used to encounter. When a certain amount of headache or backache does occur in the first two or three days after the operation, it can be easily and swiftly relieved by the rectal instillation of an ounce or two of concentrated magnesium sulphate solution. I once, during my house surgeon days, saw a case of permanent paralysis of the left external *rectus oculi* muscle after spinally administered "Stovaine". That was twenty years ago, and I do not think that with the use of "Novocain" and modern technique it would ever be likely to occur. One of my patients developed a persistent distension with vomiting and constipation after an operation for inguinal hernia; but after a few days of discomfort on his part, and acute anxiety on mine, his symptoms disappeared and he recovered smoothly. That is the only case I have to report of any post-operative ill effects.

Level and Duration of Anæsthesia.

Concerning the question of the level of the anæsthesia obtained, and its duration, much has been written of recent years on the matter of diffusion, concentration and fixation of the "Novocain" in the spinal theca and cord. These writings include those of Pitkin, on his attempt to obtain a strictly controllable anæsthetic level by the use of his heavy and light solutions of "Spinocaine" and tilting the patient in the appropriate manner to make the solution run upward or downward in the theca to the desired level. His work has been frankly questioned by other writers, who state that his solutions quickly lose their identity in the cerebro-spinal fluid, and become lighter or heavier by diffusion until they are isobaric with the fluid itself. I have never used either form of "Spinocaine", so I am unable to speak of it. Barker's original glucose-"Stovaine" solution was based on the same principle of injecting a hyperbaric solution, and I doubt if the principle promises any final solution of the difficulty. Some endeavour to send the anæsthetic solution higher in the theca by energetically mixing

it with the cerebro-spinal fluid before fixation or diffusion occur. This is accomplished by withdrawing a syringeful of the fluid after injection and reinjecting it once or twice. There is no doubt that this procedure has an effect on the level of anæsthesia produced, as has any great variation in the speed of injection; but it is certainly not controllable. Not a great difference in the anæsthetic level is obtained by using the second or fourth space for injection instead of the usual third. My routine technique is the injection of two cubic centimetres of prepared "Novocain" in 5% solution (Bull) into the third lumbar space at moderate speed, with the patient in the lateral position and the spinal column horizontal. It produces an anæsthesia the level of which is on an average somewhere between the nipples and the costal margin in its upper level, sometimes going above the nipples, but occasionally not rising above the umbilicus.

Like everyone who uses spinal anæsthesia frequently, I can report freak cases, as in one woman in whom the anæsthesia was strictly confined to the perineum and anus. Her thighs and pubis and abdomen were entirely normal in sensation, but as she was fortunately being submitted to curettage of the uterus it did not matter. Cases such as this should not occur. If the solution is reliable and is injected wholly into the theca, it does produce the necessary blockage. When a minimal or no anæsthesia occurs in spite of a flow of spinal fluid from the needle before injection, the explanation probably is that only the point of the needle has penetrated the theca, the heel of the bevel remaining outside, and the "Novocain" solution escapes wholly or in part through it and does not enter the theca. The shortest bevel on the needle consistent with good penetration is advisable. A more troublesome variation in the anæsthesia produced is the occasional persistence of peritoneal sensibility. One often finds that the patients complain of a deep substernal or epigastric pain when the mesentery is dragged on or handled, and this is often noticeable when the meso-appendix is being ligated or cut. In these circumstances I generally infiltrate the meso-appendix with a few drops of 1% "Novocain" solution before tying it, and this is usually effective. The persistence of some degree of visceral sensibility, which mainly occurs when the anæsthetic level does not rise above the costal margin, is a factor in altering the blood pressure curve to some extent, as I shall mention later on. The duration of the anæsthesia varies from half to one and a half hours. Usually one can reckon on having from three-quarters to one hour for the work proposed. I do not know of any method by which one can foretell or control this variation.

Emotional Response of the Patient.

The emotional response of the patient is a more important factor than the foregoing in deciding on the use of spinal anæsthesia. The nervous, excitable type of patient suffers greatly from the emotional strain, while lying conscious on the table; and in itself this may be sufficient to bar the use of the method in his case in emergency cases. Even the more phlegmatic and untroubled class of people find the strain of lying on the operating table, in the circumstances and with the surroundings of the operating theatre, a considerable ordeal; and some effective method of dulling their mentality and reducing the effects of apprehension must be employed. I have been using for some time 1·0 gramme (fifteen grains) of "Luminal", given three hours before the operation, and I find it has many advantages over the usual 0·015 gramme (one-quarter of a grain) of morphine. I have not used morphine and hyoscine in repeated doses, which, I understand, is fairly largely used in at least one clinic in Melbourne. I have been rather afraid of the delirium and restlessness which sometimes follow repeated doses of hyoscine, as they do so often in "twilight sleep" in obstetrics. I am, however, open to conviction on the point. The "Luminal" makes the patients sleepy and dull, not only for the hour or two before the operation, during all the preparatory stages, but also for the whole of the following day, so that the whole ordeal remains mainly as a rather blurred memory. It does not, however, entirely abolish their apprehension nor their knowledge of their surroundings, and in nervous, frightened patients apprehension may overcome the dulling effects of the drug to such an extent that vomiting may occur even before the injection is given. One patient of mine began to feel "qualmy" immediately on being wheeled to the theatre, vomited during the administration of the "Novocain" and continued vomiting until he was back in bed. Whether the cause of that was the "Luminal" he had had or because the "Luminal" was not sufficient to allay his apprehension properly, I do not know, but I suspect the latter. It was at any rate not due to the "Novocain". "Luminal", in my opinion, has shown itself very valuable, particularly for patients who would normally be favourable subjects for spinal anæsthesia, and for patients whose emotional stability was only a little below the normal. I do not feel, however, that it is the "last word" in narcosis for spinal anæsthesia.

In further regard to the effects of the emotional reactions of patients, it is an interesting fact that when the fears and apprehensions of the patients are not aroused by the idea of operation and the surroundings of the operating theatre, spinal anæsthesia goes much more smoothly. I have found this particularly so in cystoscopic examinations in men. In no single case of these have I yet found even the slight nausea or faintness, or the single vomit which is so usual a feature of "spinals". Also I have noticed that its use in obstetrics is very well tolerated, probably for the same reason. The sudden relief from the pains is thoroughly pleasant to the patient, and her apprehension is correspondingly relieved rather than roused. Spinal anæsthesia, induced at the correct stage, is very satisfactory in obstetrics, the pains remaining strong and the perineal relaxation being of great assistance. In general the

emotional response of the patient is a variable factor, which is not yet, I think, effectively brought under control; and therefore a certain selection of patients, excluding the highly nervous patients (it is unfortunately not always easy to make a successful selection), should be practised if surgeons are to avoid troublesome experiences and operative difficulties which are not there in satisfactory cases.

The Vasomotor Reaction.

The third variable factor is the vasomotor reaction, the fall in blood pressure. This is the most widely known and most feared complication of spinal anæsthesia, and I think the least important. It certainly can be alarming at times, particularly if the blood pressure is being recorded and charted during the operation; but I am very doubtful if it has many real ill effects. It certainly is not such a hindrance to the surgeon as is a faulty anæsthesia level or a bad emotional response.

The main factor in its causation is generally assumed to be splanchnic vaso-dilatation. I do not know that any experimental proof of this exists. In general, while spinal block causes relaxation of all skeletal muscle, it causes definite contraction of the involuntary muscle everywhere. This is shown by the enhanced pains in the parturient uterus with spinal anæsthesia, and is further demonstrated by the use of spinal blockage to overcome the constipation in a paralytic ileus. On opening the abdomen under spinal anæsthesia there is never any reddening of the viscera observed, the hollow organs in the peritoneal cavity being in a contracted state. The fall is not at any rate entirely due to shock from handling of imperfectly desensitized viscera, for it will occur in operations outside the abdomen equally with laparotomy. I recently read an article, I think it was in *The British Medical Journal*, the writer of which ascribed the fall in blood pressure largely to "Novocain" poisoning due to absorption of the drug from the cerebro-spinal fluid. This may occur, but one does not observe a similar fall in blood pressure in local, regional or sacral blocks, in which a much greater amount of "Novocain" is injected, though possibly it is not absorbed at so great a rate. The fall does seem to be a definite result of the injection of "Novocain" into the spinal theca, whether due to the general action of the absorbed drug or to the blockage of the spinal impulses. It does not appear to depend on or to correspond with the level of the anæsthesia obtained. It is said to be less marked in younger persons than in the old, and less great proportionately in those with an initially low blood pressure than in those with an ordinarily high pressure. I would agree with both those statements, though my own charts are not very definite on the subject.

The characteristic fall occurs from ten to fifteen minutes after the injection of the anæsthetic. It averaged in my cases roughly 35 millimetres of mercury in the earlier cases, when I was not using ephedrine, and 20 millimetres in the later cases, in which ephedrine was used. Its duration is variable, being probably in many cases affected by factors other than the primary cause of the fall, emotional tension and visceral handling, for example. My charts, a small series only, suggest that when the abdomen is not opened, the pressure reaches its lowest point and returns to approximately its original level in anything from five to twenty minutes. When the abdomen is opened and the viscera are handled, the period of depression is in general somewhat lengthened, and the point of return is rather below the original reading. Any average in these cases, however, is apt to be rather misleading, as the charts vary from no fall whatever to fairly severe falls, without the reason for the difference being apparent. The most important point about the blood pressure fall, however, seems to be that if it is unassociated with other symptoms, it need cause no great alarm and need not interfere with the surgeon in his work, except perhaps for an alteration in the position of the patient in the way of lowering the head of the table, even when, as recorded in millimetres of mercury, there is a very severe fall. Naturally being so much dreaded, it has been subjected to much inquiry as to possible methods of eliminating it; and the main outcome of these inquiries has been the establishment of the injection of ephedrine as a routine measure. Ephedrine, correctly given, does undoubtedly lessen the extent of the drop. In my series of charted cases, the average fall has been reduced from 35 to 20 millimetres by its routine use. I have two charts of patients each of whom had two operations under spinal anæsthesia, one being with ephedrine and the other without it. The difference in depth and shape of the two curves is quite striking. Ephedrine has unquestionably lifted the cloud of mistrust to some extent, which has for so long hung over the use of spinal anæsthesia, owing to the supposed danger to the patient of the sudden severe pressure drop. I am not able to subscribe, however, to the view, often expressed, that since the use of ephedrine severe falls in blood pressure do not occur. The case I quoted previously is a case in point. Another case was that of prostatectomy in a man of seventy-two; in this instance the preoperative reading of the blood pressure was 180, and the lowest point reached during the operation was 50 millimetres, and ephedrine had been given in the routine manner. I have given ephedrine in doses of 0·03 gramme (half a grain) and in doses up to 0·15 gramme (two and a half grains). I have given it in single doses, and in repeated doses. I have given it a quarter of an hour before the spinal injection, and at intervals of three minutes for five doses after the injection. I now use as a routine an injection of 0·03 gramme (half a grain) and give it intramuscularly at the same time as the injection of the anæsthetic agent is being given. I feel I get as good results with that method as with any of the others. One definite fact emerges from the study of its use, and that is, that once the pressure has started to fall, neither ephedrine nor pituitrin nor any other drug at present at our disposal will

check its progress downward. The time to use ephedrine is before the factors which cause the fall, whatever they are, commence to act. The most effective method of checking a severe fall which is well established, is in my experience steep lowering of the head of the table. Several of my charts illustrate this effect, together with a drop back again when the table is raised to level for operative reasons. I have never had to give intravenous infusions of any sort to restore the pressure, and I hope I shall never have to do so.

Nausea and Vomiting.

The other phenomenon which occurs in the course of spinal anæsthesia to worry the patient and the surgeon is nausea and vomiting. Its causation is not clear and its association with a falling blood pressure is also rather obscure. On the one hand one finds a patient with a fall of 80 millimetres of mercury feeling no distress of this kind at all, complaining of nothing more than a little faintness; and on the other a patient with a maximum drop of 10 millimetres during a varicocele operation may vomit incessantly. One finds sometimes that the patient will start to vomit before the "Novocain" is even injected. I have noted that on several occasions, including the occasion I have already set out, and in one or two abdominal emergencies in which no "Luminal" or other drug had been given. I have seen the same thing reported in statistical articles on spinal anæsthesia. I presume that this effect must be to some extent at least emotional in origin, and possibly a more effective method of narcotizing patients may help to eliminate it. One can understand the occurrence of this effect more easily when vomiting occurs during intraabdominal work, and is somewhat related in time to visceral handling, particularly when peritoneal sensibility has not been thoroughly abolished. Apart from all these, there is a definite tendency for a patient to vomit while he is undergoing operation during spinal anæsthesia. In the early days with "Stovaine" we used regularly to expect it. Nowadays it occurs decidedly less often, but all the same it will occur in a certain number of cases, and the surgeon has to be on his guard and must reasonably expect one attack of vomiting to occur in any given case, whether he is working on the abdomen or not. Vomiting does little harm, and in comparison with the vomiting after ether, is very slight. The patient will generally give warning of its approach, and the surgeon must then direct his attention to it. If the patient can take a few deep breaths through the open mouth, he may possibly ward it off; but if the abdomen is opened, warm packs must be put over the wound and care taken to see that abdominal viscera are not expelled during the spasm. The spasm very soon passes, and is generally not repeated.

The Post-Operative Course.

Having laid stress on the disadvantages, possible, probable and actual, of spinal anæsthesia, it is pleasant to turn to the post-operative course, about which there is no doubt. There is no retching or nausea, no restlessness or struggling, no persistent taste of ether. If the patient has had "Luminal" he generally sleeps the day out, and when the effect of the anæsthetic has passed off, the usual injection of morphine for local pain is often not required. Backache and headache should be at a minimum with good technique, but if they should be troublesome, an ounce or two of concentrated magnesium sulphate injected into the rectum will bring the necessary relief. Of post-operative complications I have, as I said earlier, met only one, a troublesome distension, which, as I had not previously encountered it, worried me more than it probably should have done. It is reported in the journals as an occasional complication. Pulmonary complications I have not yet met, I am glad to say. Writers in the journals state that these are no less rare after spinal than after general anæsthesia. Of that I cannot speak personally, but I must confess I should be inclined, when some bronchitis or a cold made one hesitate to give ether, to use spinal anæsthesia with more confidence.

Conclusions.

I have tried to discuss fairly the subject of a method of anæsthesia which has always interested and attracted me, setting out as evenly as possible the disadvantages which have so far militated against its general adoption. If the causation of these disadvantages is more closely studied, I have no doubt that they will be gradually eliminated, as many of them have been already. A spinal anæsthesia that "goes well" is a most pleasant experience for the surgeon and is what I would unhesitatingly choose for myself were I to be a patient. The average case in which everything goes well except for a little nausea and perhaps one attack of vomiting, is less pleasant for a fully conscious patient than the unconsciousness of general anæsthesia, but the induction and the stage of recovery are infinitely more pleasant.

No one type of anæsthesia will probably ever become universal. All the varying methods have and will continue to have their advocates, and also a proportion of cases for which they are unsuitable. In hospital centres proper equipment for all the different methods will be available. The claims of those methods which require costly apparatus and skilled administration, such as gas and oxygen and ethylene, cannot be denied. Intravenously or orally administered "Amytal", with local or general reinforcement, will probably have a large field in the future. General anæsthesia induced by the open method, with its safety and certainty, will fight hard before losing its supremacy among men whose distance from hospital centres and sources of supply militates against the use of the more costly apparatus. And, finally, spinal blockage is anatomically limited in its use to certain regions of the body only. But spinal anæsthesia, with effective dulling of the patient's consciousness beforehand, is certainly worthy of a place in the surgeon's

armamentarium, and after years of struggle is slowly winning that place. Its advantages are so striking that if and when its more obvious drawbacks are eliminated, as they will be by further study and further experience, it will undoubtedly commend itself to an increasing number of surgeons as the anæsthetic of choice in the majority of cases requiring operation on regions below the diaphragm.

SOME REMARKS ON THE EARLY PHENOMENA AND NATURAL COURSE OF A FEW COMMON DISEASES.[1]

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I HAVE some hesitation in presenting this paper. It contains no new research, no records of detailed laboratory experiments and no results of any new biochemical test or instrument of diagnosis. It merely contains a few reflections that have resulted from observations made during the performance of routine medical work.

The greatest privilege and the most bounden duty devolving on the medical profession is the prevention of disease. At present, however, except in comparatively few diseases, we are unable to exercise this privilege, partly from lack of opportunity and organization, but also from a paucity of knowledge with regard to the causation and mode of origin of many common diseases. Routine medical inspection is as yet too limited to be of any very great value, and even should it become more general in its application, would have to be carried out in a most thorough and painstaking manner in order to be really effective. Consequently, the next best thing available is a close study of the early phenomena of disease, what are their manifestations, and what measures can be undertaken to arrest or cure them. Many patients suffering from common chronic diseases pass through our hands with the condition unrecognized, or even if it is recognized, the patients may receive inadequate treatment. The subject of this paper has been chosen largely because a considerable percentage of the patients whom I have seen, suffered from advanced and often incurable disease. From a consideration of the past history of such patients, an attempt has been made to determine what were the earliest manifestations of their disease, and whether any measures might have been adopted to stay their course.

A patient may exhibit undoubted evidence indicating the possibility or even probability of serious disease in the future, and yet at the time may look and feel perfectly well. There is a distinct danger that he may be lulled into a sense of false security, and the golden opportunity for effective treatment may be missed. This proposition will be freely granted in the presence of a hard chancre or a sudden hæmoptysis, but there are many other conditions in which the evidence is perhaps not so convincing, yet sufficiently definite to warrant prompt and effective action, for example, in cases of albuminuria following tonsillitis, early cirrhosis of the liver, or in patients exhibiting what might be called a preepileptic state.

There is, of course, the opposite danger of diagnosing disease when it does not exist. A great deal of harm may be done from a diagnosis of heart disease or tuberculosis without adequate reason, and this may be avoided only by a very close study of the true early phenomena of disease and a prolonged observation of the subsequent course of patients exhibiting such phenomena.

The early stages of disease may manifest themselves either by signs or symptoms. The late James Mackenzie emphasized the extreme importance of a careful and intelligent study of the patient's early symptoms, and stated: "Long before physical signs become perceptible the evidence of disease is there. The patient's sensations give absolutely truthful evidence, but unfortunately we are unable to interpret them." While admitting that this is frequently the case, particularly in some cardiac and gastro-intestinal affections, yet there must surely be many exceptions. A positive Wassermann reaction and changes in the cerebro-spinal fluid may be present without any nervous symptoms. There may be sugar in the urine and no symptoms of diabetes.

In organs possessing a considerable reserve function, particularly the liver and the kidneys, even extensive disease may be present without there being any definite symptoms, hence the importance of making a complete routine physical examination in patients presenting themselves for an "overhaul" or for the first time for some minor ailment.

If we are to understand and to diagnose correctly the early stages of disease and to establish a firm basis for prognosis and treatment, a number of cases of each disease should be followed through from their beginning to their termination. Information of this kind is still very imperfect and would be of immense value in dealing with many chronic diseases. Do all adenomata of the thyreoid eventually become toxic or malignant? Are young adults with blood pressures ranging about 150 to 170 millimetres of mercury potential candidates for arteriosclerosis in adult life? What is the ultimate outcome of the common parenchymatous enlargement of the thyreoid at puberty? What percentage of patients with acute nephritis develop chronic disease? Dogmatic assertions on all these queries are frequently made, but it is difficult to find the necessary observations on which such statements are based. Knowledge of this kind can best be obtained by the general practitioner, who alone has the opportunity of following patients for long periods of time.

Some information as to early phenomena and natural course of diseases, perhaps not so definite and reliable, can be obtained in a retrospective way

[1] Read at a meeting of the Victorian Branch of the British Medical Association at Geelong on March 19, 1932.

by a careful history taken from patients with well established disease. In many epileptics suggestive data can often be elicited long before the first fit occurs. A history of pleurisy is obtained in a sufficient percentage of cases of pulmonary tuberculosis to make us regard it as of definite significance. In patients with well established and easily recognizable disease, it is a profitable study to delve into the past and try to ascertain what was the first recognizable evidence of the particular disease in question.

Rheumatic Heart Disease.

It is a familiar observation that many patients with rheumatic heart disease give no definite history of rheumatic fever. The onset symptoms of the original rheumatic infection may have been so slight that their significance was overlooked, or they may not even have been complained of. There may be no history of any joint involvement at all, or at most a few "growing" pains. Hence sore throats in children, particularly if accompanied by anæmia, "growing pains" or ill health out of all proportion to the local disease, should lead to a very careful examination and appropriate treatment of the throat and close observation of the cardiac condition.

In those patients with a history of rheumatic fever symptoms of cardiac impairment may not appear for years afterwards, and in others quite soon after the original infection. In those showing early evidence of cardiac disease, it is perhaps obvious that the heart was infected at the time of the original attack, but what has been the sequence of events in those showing their first symptoms twenty or even forty years later?

The old idea was that a certain amount of myocardial and valvular damage had been sustained at the time of the original attack and that symptoms appeared when compensation broke down. This explanation will not bear critical analysis, and the only theory which satisfactorily covers the facts, is that the heart is infected in the original attack, just as it often is in syphilis. The organisms may immediately become active and cause severe heart disease, they may remain latent for years, doing very little or no appreciable damage, and later burst into activity, or they may be overcome by the natural defences of the body. This conception is, I believe, vital to a proper understanding of the problems of treatment and prognosis in rheumatic heart disease.

The reasons for this view are as follows:

1. Microscopical examination of the cardiac tissues shows evidence of old inflammation side by side with recent and newer changes.

2. Sometimes a history of recurrent joint pains or even of repeated attacks of rheumatic fever is elicited over a period of many years. This occurs in many cases of rheumatic heart disease with mitral stenosis. These are surely not separate new attacks, but are recurrences of the original infection.

3. Patients with a mitral valve lesion frequently show successive alterations in the physical signs, indicating a gradual increase in the degree of stenosis. These changes may occur slowly or rapidly or may remain stationary for a time and then progress. It is very difficult to account for this, except on the grounds of a persisting cardiac infection.

If this be admitted, how does it affect our attitude towards early diagnosis and treatment of rheumatic heart disease? In and immediately after the original rheumatic infection can we determine whether the heart has been infected or not? In some cases the decision is easy. Persisting cardiac enlargement, a temperature remaining elevated after the joint manifestations have subsided, persisting leucocytosis, a pulse rate that remains unduly rapid, evidences of pericarditis or delayed conduction in the bundle tissues, will point definitely to cardiac involvement. In others, however, showing no definite evidence of cardiac disease, can we say that the heart has not been infected? I think not. A few organisms may have lodged in the cardiac tissues and caused at the time so little damage, or even none, that signs and symptoms are absent. In future years this latent infection may reawaken and progress.

If this be so, then any patient who has had a definite attack of rheumatic fever, should be treated as if the heart were infected, whether there be evidence of this or not. Drugs are of very little value, and it is doubtful if the prolonged administration of salicylates helps, but prolonged rest in bed with plenty of fresh air and sunshine for at least several months, does help to overcome any latent infection that might be present. Rest and the usual hygienic measures, as used in tuberculosis, are of marked value in combating chronic infections for which we have no specific remedy. This treatment not only rests the heart as far as it is possible to rest it, but it also allows the patient to conserve all his energies for fighting the latent infection. Tonsillectomy is also usually advised, as there is strong evidence pointing to the tonsil as the common portal of entry. It may be argued that it is too late to perform tonsillectomy after infection has already occurred, but it may prevent subsequent reinfection from the same site. In well established rheumatic heart disease tonsillectomy is not indicated as a routine.

In addition to these measures, should any restriction be placed on the patient's future activities? It might be argued that if there is no cardiac enlargement, if there are no signs of heart disease and no limitation of the response to effort, this is entirely unnecessary. But is it not possible that a latent cardiac infection may be reawakened into activity by excessive physical strain or exposure? Several patients have been observed in whom this appeared to have happened. Severe and prolonged physical exertion may not damage a healthy heart; even this is open to debate. It is at least possible that it may do harm to a heart harbouring a latent infection. It may not be absolutely necessary, but it is at

least justifiable and reasonable to advise that, for some years after a definite attack of rheumatic fever, severe and prolonged physical exertion of the competitive type be avoided. I have on many occasions had the opportunity of examining patients who have had an attack of rheumatic fever some years previously and who have sought advice about some extra-cardiac condition. They had not complained of any cardiac symptoms, yet physical examination of the heart had in some of them revealed some degree of cardiac enlargement, a loud pulmonic second sound and a systolic apical murmur. A few of these patients have been followed up for a number of years, and some of them now show symptoms of cardiac impairment and signs of mitral stenosis. Can anything be done to arrest the progress in these cases and prevent the development of serious heart disease? It is probably too late to remove focal infection. Salicylates have been tried and found wanting. The most important advice is to insure that they live well within their cardiac income and, if possible, choose a suitable occupation.

Albuminuria.

The significance of finding albumin in the urine is a problem which frequently confronts us. It would not be possible to discuss all the varieties and types of albuminuria, but there is one type I should like briefly to mention, and that is a young patient in whom albumin in quite definite amounts is detected by the ordinary heat and acetic acid test and in whom there are no easily recognizable signs or symptoms of renal disease.

Maclean states:

> Even in patients who formerly suffered from acute nephritis, the persistence of protein in the urine is no indication that the disease is progressive, for there are undoubtedly cases where marked albuminuria is found many years after the initial attack and no deficiency of the kidney is indicated by the usual tests for renal efficiency. In every case of albuminuria it is therefore essential to have the kidneys examined by these tests.

He also states:

> The presence of albumin and a few epithelial casts is no indication that we are dealing with deficient kidneys.

The inference to be gained from these statements is that albumin and casts in the urine can be more or less disregarded so long as the patient has no symptoms and the results of renal function tests are normal. While admitting that these statements may be correct in respect to some patients, I do not think they apply to all. A number of patients have been observed, both with and without a definite history of acute nephritis, who have had albumin and casts in the urine and who have given normal results to renal function tests and who have remained in good health for a number of years, and yet later have developed a serious grade of chronic nephritis. The commonly used renal function tests reveal only advanced renal disease. The future of any patient whose urine persistently contains albumin and casts, should be regarded with some anxiety, even though at the time the results of renal function tests are normal.

Can anything be done to prevent the development of these cases? Patients with acute nephritis should be rested until the urine clears, or at any rate for a minimum period of three months. The usual dietetic measures should be thoroughly carried out and any focal infection dealt with. It is possible that alkalinization of the urine may help. In most cases it will be found that the urine clears satisfactorily. In a few, however, it will be found that, even after three months' rest, there are still albumin and casts in the urine. If possible, these patients should be rested for a still further period until it is demonstrated that the urinary findings do not vary and exercise causes no increase in the albumin, casts and blood. The urine may still clear even after eighteen months or two years, but if albumin and casts persist after this time, there is a distinct possibility that chronic renal disease will develop later. It is wise for such patients to lead a quiet life and take a low protein diet.

For patients with so-called hæmorrhagic acute nephritis, who have little or no œdema and whose urine is not much diminished in amount, but contains blood and merely a few casts, there is as a rule a better ultimate prognosis than there is for those with renal œdema and urine containing a large number of casts. It is important also to remember that mild attacks of nephritis following on tonsillitis are easily overlooked unless the urine is examined as a routine. If albumin and casts are found in such cases, the patients should be made to rest until the urine clears.

The diagnosis of adolescent or functional albuminuria is apt to be made too lightly. The albuminuria of kidney disease is often, to some extent at least, orthostatic. If the urine persistently contains an abnormal number of casts and leucocytes, a diagnosis of adolescent albuminuria is not tenable, even if the results of renal function tests are normal.

Some cases of acute nephritis are latent, and no symptoms may be complained of at the time. In these, if albumin persists, a diagnosis of adolescent albuminuria is easily made, unless the urinary deposit is carefully examined by the microscope. I have several times found blood, casts and albumin in the urine during the course of a routine examination, and I think it possible that many cases of chronic nephritis in young people have resulted from a previous latent acute attack.

Glycosuria.

Sugar in the urine, if accompanied by definite symptoms of diabetes or by a definitely abnormal blood sugar curve, is, of course, universally recognized and treated as being due to diabetes. What attitude, however, are we to adopt to those patients, and they are by no means rare, who have a reducing body in the urine which can be proved to be glucose, and yet whose blood sugar curve is not definitely of the diabetic type? Some of these are sufferers from renal glycosuria with a low renal threshold, but others are not of this type, as indicated by the fact that the glycosuria can be controlled by diet.

The tendency at the present time is to regard these patients as non-diabetic and not requiring treatment. I have observed several of these patients whose blood sugar curves several years previously were found to be normal and who are now definitely diabetic. Sugar in the urine which is controllable by dietetic measures, should be regarded and treated as being due to diabetes, even if the blood sugar curve is within normal limits.

Epilepsy.

Epilepsy has a good prognosis only if recognized and treated early, when few or no definite fits have occurred. The longer the condition persists untreated, the more difficult it becomes to cure. As pointed out by Gowers years ago, it is a self-perpetuating disease. Each fit or each epileptic manifestation seems to make another more likely.

The cause of idiopathic epilepsy is still unknown. It is not so much a specific disease as a series of manifestations which depend on two main factors, a nervous system more or less prone to become epileptic, and some stimulus or stimuli acting on the nervous system.

Many known stimuli can produce epileptic phenomena, for example, cerebral anæmia in heart block, certain poisons as in uræmia and eclampsia, organic disease of the brain, and probably psychological stimuli. If the stimulus be strong enough and appropriate, it is probably possible to produce some epileptic manifestation in almost any nervous system; on the other hand, in some epileptics fits seem to occur without any recognizable stimulus. In every individual there is a certain resistance, but it varies considerably. In some it is easily broken down, and in others not. The early signs of disease are often not a fit, but some less obvious manifestation. It is suggested then that the successful treatment of epilepsy depends on the following considerations:

1. A close study of the early phenomena of the disease, phenomena that may occur for years before an actual fit; in other words, an attempt made to recognize the type of nervous system that may become epileptic, and the adoption of measures that may help to prevent this. In fully declared epilepsy often much useful information can be obtained by a careful inquiry into the past history, information that may be of value in recognizing the possible development of epilepsy in a patient not yet frankly epileptic.

2. A close inquiry into the circumstances attending the development of a fit, particularly the early fits, so that if any exciting cause be elicited, measures may be taken to avoid such in the future.

3. A recognition that epilepsy is a self perpetuating disease, each fit making another more likely, so that even after a single fit medicinal treatment should be insisted on for two or three years and certain hygienic rules permanently observed. Time will not permit of a full discussion of all these points, but brief mention will be made of the preepileptic state and its treatment. My attention was first directed to this aspect of the problem from a close personal contact with two families with a marked epileptic family history. Several members of these families, whilst not definitely epileptic, exhibited quite definite phenomena, a history of which has since repeatedly been obtained in fully developed epilepsy. There is often a distinct alteration in temperament, a tendency to be egocentric, to live to themselves and be unduly sensitive. The patients may exhibit sudden alterations in mood in which they may become very depressed or less frequently elated and excited and show unaccountable bursts of bad temper. There is often marked constipation and an abnormally big appetite. During early life there may have been a marked tendency to infantile convulsions, nocturnal enuresis or sleep walking. Short attacks may occur in which there is no actual loss of consciousness, but only a blurring of consciousness, perhaps very slight, during which the patient is quite aware what is going on, but does not speak or move, either because he cannot or feels disinclined to.

Various vasomotor disturbances may be complained of, such as faintings, flushings, sweating and peculiar abdominal cardiac and respiratory disturbances which the patient is unable accurately to describe. The individual may be suddenly awakened either just after going to sleep or in the early hours of the morning by the occurrence of one or more myoclonic twitchings, which may also occur during waking hours. There is often a definite lack of sustained effort or concentration, so that the choice of an occupation is often difficult, the individual showing a disinclination to settle down to regular work or rapidly changing from one occupation to another, not remaining long enough at any one occupation to become proficient at it.

The period of puberty and the few years succeeding this are a specially dangerous period, and excessive study or overstrain at this time may easily precipitate a fit.

It is, of course, freely admitted that one or more of these symptoms are frequently present in individuals who never develop epilepsy, but they nevertheless indicate a type which can sometimes be recognized and should be treated, particularly when occuring in a family with an epileptic history.

The general health should receive first attention. Any factor lowering this will tend to increase the irritability of the nervous system and thus predispose to further trouble. Constipation should be treated and any minor cause of ill health, such as septic foci and eye strain, should be dealt with. Plenty of fresh air and sunshine should be insisted on. Long hours of rest at night should be advised, and with children periods of rest in the day. Food should be light and easily digestible and given preferably in small frequent feedings. Overeating should be guarded against. Physical and mental overstrain, particularly of the intense competitive type, should be avoided. Alcohol should be prohibited and also excessive smoking. The general idea should be to protect the individual from over-

strain of any kind, physical, mental or psychological, and at the same time to provide healthy, congenial occupation. Should a definite fit occur, then drug treatment should be commenced at once and continued for at least two years after the last fit. Careful inquiry should be made into all the circumstances attending the development of the first fit, and if any exciting cause be elicited, it should be avoided in the future.

Cirrhosis of the Liver.

Cirrhosis of the liver, often of a fairly severe grade, is frequently seen in the *post mortem* room. It is much less frequently diagnosed during life, and then usually only in the advanced stages. Are there any phenomena which will enable us to recognize cirrhosis at a comparatively early stage. The history may afford some assistance, but all cases are not due to alcohol; highly spiced and seasoned food may be the cause. The facies may be suggestive, a muddy complexion with bright, slightly watery eyes, and superficial veins unduly marked. There may be symptoms of chronic gastritis, particularly of the type with early morning vomiting, nausea and less of appetite. A sudden hæmatemesis may direct attention to the condition. The only definite physical signs are a palpable, tender liver, and particularly a palpable spleen, which latter finding may be the only sign present. Liver function tests are as yet not sufficiently accurate to be of much value. Appropriate treatment, chiefly in the way of simplification of the diet along the lines advised for a convalescent ulcer patient with treatment for the chronic gastritis and constipation, may help to prevent further liver damage.

Peptic Ulcer.

In the early stages of peptic ulcer, before any marked organic change has occurred, the treatment is almost universally recognized to be medical. A considerable percentage of patients with advanced ulcer have had symptoms for years, and in their earlier attack of indigestion have taken treatment for only a short time, until their immediate symptoms have been relieved. If medical treatment, even of a very simple character, had been persisted with, it is possible that a chronic ulcer might not have developed.

The history in the early stages of an ulcer is often sufficiently definite to allow of a probable diagnosis being made, even though a definite ulcer may not be demonstrable on radiological examination. In the first place the dyspepsia is intermittent, occurring in attacks, each attack lasting for about a fortnight and separated from other attacks by weeks or months. In the intervals the patient usually feels well.

In the second place there is pain, not merely discomfort, which has a definite time relationship to food. In eliciting this history do not ask if the pain has any relationship to meals, but question as to the times in the day when meals are taken and the times when the pain occurs, never omitting to ask about night pain. Patients may not recognize the relationship of the pain to food and yet may give a very definite history when questioned in the above way. The prompt and unhesitating manner in which the times in the day when the pain occurs are given, is of considerable value in diagnosis. If it can be ascertained that the dyspepsia is intermittent, with pain which tends to occur when the stomach is empty, then the patient should be treated as having an early ulcer, even though other investigations yield no definite evidence. In many cases of established ulcer the symptomatology may be typical in the earlier years, but may not be typical later on when complications have occurred.

What treatment should be advised in these early cases? The first essential is to explain the position to the patient, gain his confidence and convince him that it is not the present you are concerned about, but the future, that his present attack will soon pass off, whether he has treatment or not, and that some of the directions that will be given are to be permanently carried out. A preliminary period of a fortnight or so in bed is an advantage, but may not always be possible, or in very early cases really necessary. During this period either a full ulcer *régime* should be carried out if the patient goes to bed, or, if not, the full ambulatory treatment. Any focal infection should be dealt with. Then, for several months, a convalescent ulcer *régime* should be followed, and this can be done easily with the patient at work. After this, and permanently, certain simple directions should be observed. At least six feedings should be taken during the day. Meals should not be rushed and overloading of the stomach at any one meal avoided. An appropriate diet list should be provided, foods to be permanently avoided being clearly set out. With the slightest return of any indigestion the alkaline treatment should be recommenced and continued for a few months. If any very definite symptoms recur, a return to the full ulcer or convalescent ulcer *régime* may be advised. The ill effect of overwork and worry should be explained to the patient and proper vacations advised.

These directions are not burdensome and can be carried out without interfering with the patient's occupation. In many dyspepsias not due to ulcer, particularly those of functional origin, the above *régime* is beneficial, so that no great harm is done, even should the patient not have an ulcer.

Pleurisy and Hæmoptysis.

The sudden development of pleurisy or a slight hæmoptysis for which no obvious cause can be found, occurs so frequently in the history of patients with definite pulmonary tuberculosis that they must be regarded, either singly or together, as sufficient ground for a probable diagnosis of tuberculous infection. There may be no physical signs in the lungs, and X ray examination may reveal no abnormality, yet in the next few years manifest disease may develop. The infection must surely have been lying during the interval when the patient may

have felt well and kept at work. The absence of symptoms, therefore, is not proof that the infection has soundly healed. Tuberculosis, like so many chronic diseases, tends to pursue a relapsing course, and the essence of successful treatment is thorough treatment in the early stages. Furthermore, there are patients in whom the symptoms have improved or even disappeared, yet serial X ray films have shown a steady progress in the lung lesion. From time to time many criteria have been advocated to reveal whether the lesion has healed or not. None of them can be relied on in all cases. The temperature may be normal and yet the disease may progress. Active disease may be present and the sedimentation curve favourable. The von Pirquet and tuberculin tests may yield no reactions with a progressive lesion. The patient may have symptoms suggestive or almost diagnostic of pulmonary tuberculosis and yet the lesion may not be demonstrable by any method at present at our disposal. Tubercle bacilli may even be present in the sputum and X ray examination of the chest may reveal no abnormality. In patients with evidence of early pulmonary tuberculosis we have no certain means of determining when the lesion is soundly healed, so that in advising treatment we should err on the safe side. There is only one method of treatment which has definitely proved its value, and that is rest, either local to the lung or general rest. Patients with early lesions should be made to rest for a period of at least six months, with a further period of about the same time before resuming work, irrespective of what may be the result of X ray examination, temperature record, sedimentation test or any other test.

If all cases of idiopathic pleurisy and unexplained hæmoptyses were treated in this manner, at least some of them would be prevented from developing manifest tuberculosis later.

Head Injury.

It is not uncommon, following a head injury, for patients to complain of various symptoms, of which headache is the chief, and which prevent them from following their usual occupation. Other symptoms complained of are vomiting, attacks of giddiness, dimness of vision, nervousness and inability to carry out any sustained mental effort. These symptoms have long been recognized under the name of "traumatic neurasthenia" or "post-concussion neurosis". The symptoms may not appear until after the patient returns to work. The head injury need not necessarily have been severe, and there is frequently no fracture. There can be no doubt that the symptoms in most of these cases are genuine. In many of them changes can be demonstrated in the cerebro-spinal fluid, usually an increase in pressure, but sometimes hypotension or a marked instability of pressure. There may also be an excess of albumin and slight increase in sugar content, which may take weeks or months to subside. Trotter, who has operated on some of these patients, has described a condition of persisting bruising of the brain, resolution of the bruise being prevented by pressure of œdema on surrounding vessels, little or no expansion being possible in the more or less enclosed cranial cavity. Other observations tend to show that there may be a certain amount of traumatic encephalitis which may be followed by some gliosis.

Treatment on the whole is somewhat disappointing. In those showing a definite increase in tension in the cerebro-spinal fluid, rest, with occasional lumbar puncture and the use of hypertonic solutions intravenously and concentrated magnesium sulphate enemata, have sometimes resulted in improvement. Others, however, have not been completely relieved. In one case a decompression brought lasting relief and in another with hypotension in the cerebro-spinal fluid, injections of pituitrin were partially successful. The main reason for mentioning this condition is to urge that patients who have had a definite head injury with concussion be kept in bed for several weeks before returning to work. Although no neurological signs may be present, there is sufficient evidence to show that the brain has often been damaged, and the quickest way to insure resolution with a minimum of permanent change is to keep the patient quietly resting in bed.

Other diseases might be discussed in a similar manner. The future of medicine lies not in drugs, but in the prevention of disease, or failing this, the recognition and treatment of it in its early stages.

THE ENDOTRACHEAL INHALATION OF ETHER.

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THE usual method of administering ether endotracheally, the so-called "endotracheal insufflation", consists in the propulsion of ether-laden air into the patient's trachea at a pressure of from fifteen to thirty millimetres of mercury. This technique has proved for many years of the highest value in a wide range of surgical operations. When, however, large amounts of blood or morbid fluids may collect in the pharynx, the updraught of air around the endotracheal catheter is found to be only a relative, not an absolute, safeguard against the aspiration of foreign matter from the pharynx into the trachea. In cases in which this danger is to be apprehended, a safer technique is provided by the "endotracheal inhalation" of ether, a technique which is far from new, but which has escaped recognition by a medical public well aware of the advantages of the insufflation method.

The gas anæsthetist practises "endotracheal inhalation" of the gaseous anæsthetics at every administration, but often appears to forget that the same technique is applicable to ether, and of definite advantage in certain cases. This fact is sufficient apology for the present restatement of the inhalational method.

Distinction of Terms.

In endotracheal insufflation anæsthesia the anæsthetic vapour is propelled into the patient's lungs through a relatively small catheter at a definite positive pressure. The ventilation of the lungs is effected mechanically by the insufflated air and is more or less independent of the patient's own respiratory movements.

In endotracheal inhalation anæsthesia the patient inhales and exhales the anæsthetic vapour through a wide bore tracheal catheter. The anæsthetic is supplied at atmospheric pressure or at a small positive pressure (say four millimetres of mercury) to facilitate inspiration. Lung ventilation is effected entirely by the patient's own respiratory efforts.

Principles of Administration.

Endotracheal inhalation anæsthesia necessitates the use of a catheter so wide as practically to occlude the glottis, but not so large as to do injury. This catheter provides an ample airway, but prevents any inhalation of air between the catheter and the walls of the larynx. This is necessary for two reasons: (*a*) to prevent dilution of the anæsthetic with air, and (*b*) to obviate the risk of aspiration of foreign matter from the pharynx into the trachea, since the return current of air which is a feature of the insufflational technique, is here absent. When much blood may lie free in the pharynx, the latter may be packed closely around the catheter with gauze, all apprehension regarding aspiration into the trachea being thus removed. The catheter, once inserted, is practically an extension of the trachea and obviates all possibility of expiratory obstruction due to the presence of blood or mucus in the pharynx or to falling back of the tongue.

In the original technique, the catheter was connected to a piece of rubber tubing of suitable length and calibre, at the end of which was attached a source of supply of ether vapour, for example, the bowl of a Clover's inhaler or a perforated tin containing ether. In this way air was inhaled and exhaled by the patient across the surface of ether in the container. Considerable care was necessary lest fluid ether reach the air passages.

A more elegant technique is supplied by an adaptation of Magill's method for the endotracheal inhalation of gaseous anæsthetics.[1] Air supplied from a motor blower or other source is passed across the surface of ether in a container suitably equipped with a tap for the control of the ether concentration and with a guard bottle. The ether-laden air then enters a small rubber bag serving as a reservoir. It next passes, by means of a metal elbow piece, to the proximal end of the catheter. Interposed between the bag and the elbow piece is an exhaling valve, so contrived that the patient inhales air from the bag and exhales through the valve. Rebreathing occurs only in the catheter and not in the bag, unless the exhalation tension of the valve be adjusted for this purpose.

Details of Apparatus.

The details of the apparatus are shown in Figure I.

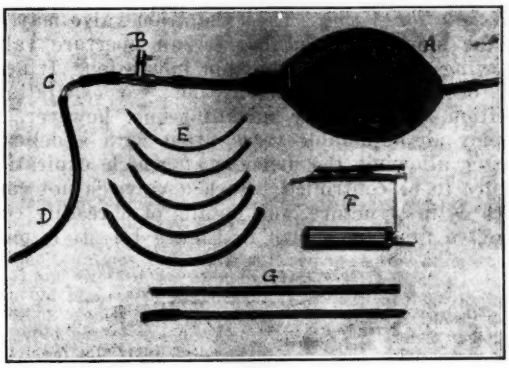

FIGURE I.
Apparatus for endotracheal inhalation anæsthesia.
A = bag, B = exhalation valve, C = metal elbow piece, D = catheter, E = Magill's catheters, of various sizes, F = Magill's laryngoscope, with battery in handle, G = silver mesh gum-elastic catheters.

Catheters. Several types of catheter are available, as follow:

(*a*) Magill's tubes[1][2] are lengths of rubber tubing, relatively thin walled for their calibre, but sufficiently rigid to withstand the pressure of the vocal cords. They are cut to a bevel at the distal end and given an anterior curve by storage in a box. They should be available in several sizes from 4·5 to 9·0 millimetres (three-sixteenths to three-eighths of an inch) in calibre, and in appropriate lengths for adults and children. The rubber tubing of commerce, though thick walled in relation to its calibre, will serve at need. Magill's tubes are highly satisfactory, are cheap and durable and, being soft, cannot readily harm the larynx. They are, however, less easy to introduce than more rigid catheters, and are liable to displacement or compression by the surgeon's manipulations.

(*b*) Silver mesh gum-elastic catheters are sufficiently familiar to need no description. They should be available in sizes up to number 38 French scale. Their faults are their cost and relative fragility, their liability to collapse before introduction unless previously chilled, and their greater risk of injuring the larynx (if inexpertly passed) as compared with rubber tubes.

(*c*) Guedel-Waters catheter[3] is a rather wide gum-elastic catheter with an external inflatable cuff. When the catheter is in position, the cuff should lie just inside the larynx and, being gently inflated, should wholly occlude it. The catheter is somewhat difficult to introduce, but, once introduced, obviates all need for subsequent packing of the pharynx.

Bag. A thin rubber bag of half-gallon capacity and provided with inlet and outlet tubes, is sufficient.

Connexions. Connexions are of metal, five centimetres (two inches) in overall length, and bent to

a curve. They should be available in sizes to correspond with the particular catheters employed, otherwise the air passage available to the patient will be unnecessarily diminished.

Exhalation Valve. The exhalation valve may be of the simplest type, that is, an aperture valve allowing of exhalation, but not inhalation. It need not even be adjustable to the "no exhalation" position. It is very advantageous, however, to employ an adjustable valve fitted with a delicate spring allowing the tension at which expiration occurs to be controlled. Such a valve is not complicated in structure, and details of a readily constructed type are shown in Figure II. It is most

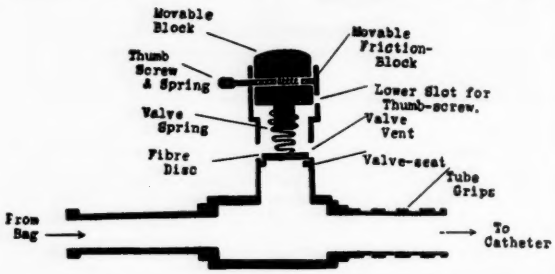

FIGURE II.

Structural diagram of an exhalation valve suitable for endotracheal inhalation anæsthesia. The movable block is moved upwards or downwards by a thumbscrew sliding in an oblique slot. This decreases or increases the tension of the valve spring on the fibre disc. The block is held in each new position by the friction produced by a small piece of metal, traversing it, and pressed against the outer casing by a tiny spring.

important that the area of the vents shall not be less than the cross section of the largest catheter employed. The valve, bag, connexions and catheters are sterilized before use by immersion in 5% carbolic acid solution or other antiseptic and then rinsed in sterile water.

Apparatus. A standard endotracheal apparatus will serve admirably; indeed a much simpler apparatus will suffice. The manometer and mercury escape valve might be dispensed with, since any excess pressure developed in the apparatus will be dissipated through the exhalation valve without coming to bear on the patient's lungs. It is not material whether the air be blown over or through the ether, provided that an efficient guard bottle be present to avert all possibility of liquid ether reaching the air passages.

Source of Supply of Air. As the supply of air is delivered at a very small pressure (say four millimetres of mercury) and as no need exists in this method for a forceful return current of air, the use of powerful motor blowers is not obligatory. A foot bellows would suffice; a motor blower is preferable, but need be operated only at low speed. A cylinder of compressed air or oxygen, fitted with a reducing or screw valve, provides agreeably silent operation at a cost of a few pence per hour.

Laryngoscope. It is possible, though difficult, to pass wide bore catheters through the standard tubular laryngoscope. The type with a lateral slot is preferable, especially where rubber catheters are employed. Magill's laryngoscope, with its very wide barrel, wide lateral slot and battery in the handle, is excellent. It is not, perhaps, ideally balanced, and its large size makes it difficult to insert into the mouth, but once the epiglottis is engaged, the exposure of the larynx is admirable.

Administration.

Intubation of the larynx is performed in the usual way; it is more difficult with wide bore catheters than with small, but is far easier under ether than under the gaseous anæsthetics. It is desirable, wherever possible, to pass the laryngoscope from the right lateral angle of the mouth, as the tongue may otherwise prolapse into the lateral slot of the instrument. The glottis being exposed, the catheter is passed outside the laryngoscope and is engaged with it only in its distal inch or so near the glottis. This permits a full view of the cords during the actual intubation, unobstructed by the size of the catheter. Anæsthesia should be sufficiently deep to relax the cords adequately. The wide bore catheters are most readily introduced if the shorter diameter of the bevel be brought into the long axis of the *rima glottidis*, as though a bronchoscope were being passed. Once the bevel has passed the rima and has pushed the cords aside, the body of the tube will follow fairly easily and can then be rotated back into the usual position with the bevel opening forwards.

After intubation the apparatus is connected and the catheter is secured to the cheek with a piece of adhesive strapping. The ether concentration is adjusted as in endotracheal insufflation anæsthesia, but the rate of delivery of air is much slower, as it is necessary to provide only for the respiratory needs of the patient and not for a return current of air. It suffices to keep the bag distended during the patient's exhalations and to see that it does not wholly collapse during his inhalations. Any greater quantity of air is excessive and will escape uselessly from the exhalation valve.

The valve is set to zero pressure or to a slight positive pressure to facilitate inspiration. This positive pressure is especially desirable during the first minutes of anæsthesia, since it aids the patient in becoming stabilized to the new conditions of respiration. Rebreathing is not usually practised, but could be arranged by suitably increasing the exhalation pressure of the valve. When a measure of lung inflation is desired, it may be secured by raising the spring pressure of the valve and compressing the bag between the anæsthetist's arm and side.

In theory the exhalation valve might be far distant from the site of operation. In practice, however, it is well to spare the patient the fatigue of breathing through a long tube, even though this be little narrower than the *rima glottidis*. It is therefore best to arrange for the exhalation valve to open close to the head, beneath the drapings, and so placed that the ether vapour gravitates directly to the floor of the operating theatre.

Respiration is never suspended, as it may be in endotracheal insufflation anæsthesia. At the same time it is usually quieter than generally obtains in the insufflational method, so that the patient appears to be rather asleep than anæsthetized. If respiration be inaudible, it may be observed from the movements of the walls of the bag. Should anæsthesia be unduly light and the patient cough, the catheter is not readily dislodged: the coughing impulse is transmitted freely through the wide lumen into the bag.

The secretion of mucus may be an annoyance, since it is more common under ether than under the gaseous anæsthetics. Usually, no ill effects are observed beyond a most disconcerting noise in the catheter. Should the mucus be so profuse as to embarrass respiration, it must be sucked out of the catheter by means of an aspirator after disconnecting the former at the metal elbow piece.

The administration otherwise resembles that of endotracheal insufflation anæsthesia. The cough reflex is somewhat slower in returning, probably because the stimulation of the respiratory mucous membrane by an insufflated current of air is wanting. Frequently the pharyngeal reflex will be found to return before the laryngeal.

The writer has found the inhalation method of great value in selected cases, particularly those associated with much bleeding, such as extensive operations upon the accessory nasal sinuses, resection of the maxilla *et cetera*. Apart from the difficulty of intubation with a wide bore catheter (a difficulty which experience does much to minimize), he has found embarrassment only when too small a catheter was employed.

Advantages of Endotracheal Inhalation Anæsthesia.

The following are the advantages of endotracheal inhalation anæsthesia:

1. The normal rhythm and amplitude of respiration is preserved.
2. The anæsthetic agent is economized.
3. An unobstructed airway for expiration is assured.
4. Aspiration of foreign matter into the trachea is obviated.
5. The field of operation is free from escaping ether vapour.

Disadvantages of Endotracheal Inhalation Anæsthesia.

The following are the disadvantages of endotracheal inhalation anæsthesia:

1. Intubation with a wide bore catheter is technically more difficult than with a small catheter.
2. The large tube may be a source of embarrassment to the surgeon, especially in such operations as tonsillectomy.

Acknowledgement.

The writer is indebted to Mr. A. Doutch, of the Baker Institute of Medical Research, for the photograph reproduced as Figure I of this article.

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Reports of Cases.

TWO FATAL CASES OF POISONING BY ACETIC ACID.

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DEATHS from the taking of acetic acid are, I think, very rare in this country, in Great Britain and the United States of America. They are said to occur quite frequently in some countries, especially in Russia. I know of only two cases, and short notes of them might be of interest.

An old man, aged seventy-six, was seen about midnight to drink something from a bottle, and a little later staggered across the floor and fell. The one-ounce bottle was labelled "glacial acetic acid", of which it smelt strongly, and the patient admitted he had swallowed the whole bottle full in an attempt to commit suicide. He died about three hours later in the Parramatta District Hospital and the clinical notes were kindly supplied to me by Dr. A. C. Saunders.

When seen at 12.25 a.m. the patient was in a condition of shock, with a temperature of 36·3° C. (97·4° F.), a pulse rate of 128 and a respiration rate of 30 per minute. His breath smelt strongly of acetic acid. His lips and tongue were burnt and he complained of burning from his mouth down to his stomach. He perspired freely and had a cold skin throughout. There was no diarrhœa.

Owing to the length of time from the taking of the acid and consequent risk of using a stomach tube, the stomach was not washed out, but the patient was given lime water to drink and later soapy water. This was followed by vomiting, the vomitus smelling of acetic acid. Further drinks of soapy water and of milk were given, and at 1 a.m. some of the vomitus was blood stained. At 12.45 a.m. 2·2 milligrammes (one-thirtieth of a grain) of strychnine were given, and at 1.10 a.m. 0·016 gramme (one-quarter of a grain) of morphine. The patient's condition was now moderately good, with slow and deep respiration and a good pulse until 3.20 a.m., when the pulse became soft and rapid, and the patient died at 3.30 a.m. No autopsy was made, but the *post mortem* appearances can be taken from the following.

A woman, aged thirty-three years, died after drinking an unknown quantity of acetic acid, and an autopsy was carried out at the Sydney morgue.

The lips showed burning. The stomach contents smelt strongly of acetic acid and its mucous membrane was deeply inflamed, in parts showing a rich crimson colour. The upper part of the small intestines was affected similarly, but to a less degree. The blood was very dark and the lungs, liver, spleen and kidneys were engorged with dark blood.

CEREBRAL FAT EMBOLISM.

By T. Y. NELSON, M.B., Ch.M. (Sydney),
Honorary Relieving Assistant Surgeon, Royal Alexandra Hospital for Children; Honorary Medical Officer, Western Suburbs Hospital, Sydney.

D.B., AGED twenty-two, motor driver, was admitted to hospital on October 30, 1931, as a result of a motor accident.

He had a fracture of the shaft of the right femur at the junction of the middle and lower thirds, and also a fracture of the right tibia and fibula fifteen centimetres (six inches) below the knee joint.

His general condition was good, his temperature was 36·7° C. (98° F.), and his pulse rate 76. He showed no signs of shock.

Under ether anæsthesia skeletal traction was applied to the condyles of the femur with 9·0 kilograms (twenty

pounds) extension weight, and Corlette's *os calcis* tractor was applied to the heel with 3·1 kilograms (seven pounds) extension weight. With the extension apparatus in position a plaster slab was moulded on to the leg from knee to toes and was then bandaged to the leg by plaster bandages after the manner of Bohler, the cast being split in its entire length as soon as it had set. The limb was then suspended in a Corlette's splint.

X ray examination the following day showed both fractures to be in good position.

On October 31 the patient's bladder was catheterized for retention of urine. He was flushed and drowsy, the temperature had risen to 38·3° C. (101° F.) and the pulse rate to 116.

On November 1 a marked change occurred. He was very breathless and cyanosed, with shallow respirations and dilated *alæ nasi*, his temperature was 38·9° C. (102° F.), his respirations 40. By the afternoon he was wildly delirious, had no control over the bladder, urine being passed involuntarily, and he showed signs of cerebral irritation. Examination of the chest revealed no adventitious sounds, but any handling of the patient increased his restlessness. Late in the day a purpuric rash was seen extending over the chest.

Subsequently the following notes are recorded.

On November 2 the patient's condition was worse. The pulse was still regular and strong. The purpuric rash was well marked over the thorax, the arms and thighs. The highest reading of chart was: temperature 37·8° C. (100° F.), pulse rate 140, respiration rate 52.

On November 3 he was still noisy and irritable. The rash was unchanged. The temperature was 37·5° C. (99·6° F.), pulse rate 150, respiration rate 60.

On November 4 there was an improvement in his condition. He was still restless, delirious and violent at times, but answered a few questions clearly. The rash was unchanged. Crepitations were audible at the bases, but there was no dulness in the chest.

By November 8 his condition had improved considerably. The rash was fading, his mental state was clearer, he was eating well, and the chest showed crepitations at both bases. He had not recovered control of the bladder sphincter. The temperature was 36·7° C. (98° F.), pulse rate 108, respiration rate 30.

By November 12 he had quite recovered and the foot of the bed, which had been lowered during his critical period, was again raised and extension reapplied to the fractures, which, in spite of his delirious and violent condition, had remained in moderately good position.

Comment.

The interest of this case does not lie in the consideration of the fractures, but rather in the complications which this patient was fortunate enough to survive.

Practitioners in Australia should be grateful to Dr. C. E. Corlette for drawing attention to the rare condition of cerebral fat embolism, on which little emphasis is laid in text books, and readers should consult his article in THE MEDICAL JOURNAL OF AUSTRALIA, March 7, 1925, for a description of the symptoms of this condition and for a survey of the literature on this subject.

The combination of delirium, high temperature and cerebral irritation, followed by a petechial rash, in a patient who has recently had a fracture of one of the long bones and no head injury, make the diagnosis fairly certain. "The most important single feature is the petechial rash, which may be looked on as a pathognomonic sign when the other circumstances are taken into consideration" (Corlette).

The time of appearance of this sign is given by various writers as from twelve hours to three days. Some of the patients die before this sign appears, but the hæmorrhagic spots may be found *post mortem* in the internal organs.

A number of cases of this condition have been reported in Continental and American literature, the vast majority being fatal and confirmed by necropsy when microscopical sections show the fat emboli in the brain and other organs.

It might be of interest to refer to two fatal cases following orthopædic manipulation reported by Clark in *The Journal of the American Medical Association*, March 19, 1927.

1. A woman, aged thirty-seven, had a chronic arthritis of many joints, causing ankylosis. Under ether anæsthesia both knees and ankles were manipulated and leg casts were applied with the foot in correction. Three hours later she experienced difficulty in breathing, and five hours later died suddenly. *Post mortem* the upper part of the tibia was found to be fractured. Section of the lungs revealed arterioles and capillaries filled with fat. Section of the brain revealed fat in the capillaries.

2. A similar case occurred in which the knees were straightened and put in plaster. Half an hour after the operation the patient became cyanosed and died in thirteen hours. *Post mortem* both femora were found to be fractured above the knee, and when the tissues of this region were opened, eight ounces of bloody fluid heavily laden with fat droplets escaped. Fat emboli were found in all the organs.

Clark concludes:

> For the production of fat emboli there must be a liberation of fat from cells in liquid form, rupture of accessible vessels and some force to drive the fat into the circulation. Fat may be liberated from cells following any injury or operation that involves fatty tissue.
>
> Fat embolism occurs most frequently after injury to long bones, but cases have been reported following breast amputation, ventral herniotomy and laminectomy, labour, severe burns and thyreoidectomy.
>
> Vessels of bone marrow do not collapse after trauma as do vessels elsewhere, because they lie in boney canals to which their walls are adherent. According to Wegelin, the transportation of fat by way of the lymphatics is negligible in the ætiology of fat embolism. The necessary force is supplied by the pressure of hæmorrhage, œdema and manipulation.

In the case reported here no examination of the urine was made at the time to ascertain the presence of renal emboli (indicated by the presence of albumin and red cells in the urine), but the occurrence of crepitations suggests the occurrence of pulmonary fat emboli.

It is possible that this condition may be the cause of some unexplained post-operative deaths.

Reviews.

EXPERIMENTAL PHYSIOLOGY.

"AN INTRODUCTION TO HUMAN EXPERIMENTAL PHYSIOLOGY", by F. W. Lamb, is an entirely new type of book, dealing as it does almost wholly with experiments to be done by students on themselves or on others.[1] It has long been realized that the older type of teaching of experimental physiology in which numerous experiments were done with frogs were not nearly as valuable to students as experiments done on human subjects, but the introduction of the idea into medical schools has been slow. Professor Lamb's book should prove very useful to teachers as indicating the types of experiments which can be carried out by students on each other. There can be no doubt that to medical students an acquaintance early in their course with the functions of the human body from their own observations and experiments is most interesting and helps them to a better understanding of the uses of a knowledge of physiology in their subsequent clinical work. The experiments described in this book deal with blood, respiration and circulation, and are well and carefully explained, but many of them could be done only with small groups of students with careful supervision. The various aspects of respiration seem to be rather overstressed and we should like to see a wider range of subjects dealt with. The book can be recommended thoroughly to physicians desiring a clear and concise account of physiological methods of investigation of the human subject.

[1] "An Introduction to Human Experimental Physiology," by F. W. Lamb, M.D., with a foreword by A. V. Hill, Sc.D., F.R.S.; 1930. London: Longmans, Green and Company, Limited. Demy 8vo., pp. 348, with diagrams. Price: 12s. 6d.

The Medical Journal of Australia

SATURDAY, MAY 14, 1932.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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THE THIRD CANCER CONFERENCE.

THE Third Cancer Conference held recently at Canberra was an event of considerable importance. As will be seen by the report published in this issue, the discussions covered a wide field. Delegates from all States except Western Australia attended. Most of the organizations to which an invitation was issued sent delegates. Unfortunately some of the Branches of the British Medical Association were not seized with the importance of the gathering and ignored the invitation. It would have been a simple matter, if finance were the bar, to have appointed as official representative one of the medical practitioners who were attending the Conference. This would have shown at least an appreciation of the efforts to coordinate the work of different centres and would have given the lie to the slander, heard far too often, that the Branches of the British Medical Association are little better than domestic housekeepers, in that they display enthusiasm only over matters of medico-political moment.

The work of the Conference was divided into several sections. The review of the activities of the previous twelve months came first and was not by any means the least important. Dr. M. J. Holmes, of the Commonwealth Department of Health, gave a dispassionate survey of the developments in connexion with cancer control in Australia, and Dr. H. G. Chapman, Director of Cancer Research at the University of Sydney, reviewed the research carried out in the several centres in the Commonwealth. Attention must be drawn to the failure of several States to inaugurate regular consultative clinics. Victoria is the worst defaulter in this regard. "Team work" is one of the catch cries heard at almost every medical gathering. Consultative clinics represent team work of the highest order. It would be interesting to know why the recommendation of the First Cancer Conference for their establishment has been ignored. An impartial observer who hears of wonderful success and inspiring progress without consultative clinics, would be justified in expecting still greater achievement if they were inaugurated and used. Another important point brought out in Dr. Holmes's review is the remarkable extent to which radon is being used. The issue by the Commonwealth Radium Laboratory of 17,021 millicuries to hospitals in Victoria, representing an increase of 43% on the amount issued in the previous year, is remarkable, and must compare more than favourably with amounts issued to a population of a similar size in other parts of the world.

The second and main object of the Conference was the discussion of common problems by experts in different branches. The treatment of malignant disease is exceedingly difficult. Morbid anatomist, physician, surgeon, physicist, chemist and radiotherapist must be available, and each and every one of them may have a part to play in the treatment of a patient. Obviously they must collaborate; each must understand the problem of the other, so that knowledge may be made available at the right moment. For example, the effect of the screenage of radium by different layers of metal, the extent of the penetration of tissues by radium needles arranged in a certain fashion around a lesion, the measuring of high voltages, and similar questions, may *per se* be of the greatest academic interest; but when they are bound up with cancer research and cancer treatment, they cease to be problems of one group and become of vital importance to several groups of workers. The discussions

at the Conference were of the greatest interest, and the keenness of the delegates was evident at every session. Discussions of this kind will lead to coordination of effort and they will be an inspiration for the future. The surroundings of Canberra are ideal for such a gathering. Most of the delegates stayed at the same hotel and, because there was no "entertainment" to distract attention, the sessions were supplemented by conversations of value. The delegates were wise in refusing the suggestion that subsequent conferences should be held at a State capital city. Apart from the idea that Canberra is "neutral" territory, it is well that a conference dealing with such technical matters should meet where it would not be invaded, if not overwhelmed, by persons who would try to make the clinical side overshadow the more important foundation of pure science. The Conference was open to medical practitioners of Canberra, and medical visitors were welcomed, but the idly curious and the limelighters, whose name is legion, will not journey to a place where there is no limelight.

The third aspect of the Conference is that of future action, and in this connexion reference must be made to the proposed educational campaign throughout the Commonwealth. This will be discussed at a later date, for medical practitioners will of necessity have a share in it.

In conclusion, the value of the Cancer Conferences must be emphasized. Successive governments have shown that they recognize the urgency of the cancer problem. The progress made in both research and treatment has been remarkable and, if the obvious sincerity of the Minister of Health in opening the Third Conference may be taken as a criterion, the present government will not permit any slackening of effort. The end of the whole matter is that Australia is building up a vast organization both in research and treatment. The scientific world will expect this organization to bear fruit. Australia must be worthy of her opportunity.

Current Comment.

ACUTE SUPPURATIVE PAROTITIS.

A. L. BERNDT, R. BUCK AND R. VON L. BUXTON have made an experimental study of acute suppurative parotitis.[1] This condition is not uncommon, occurring most often during infectious diseases, in debilitating states and after surgical operations. It develops only occasionally as a primary condition in an otherwise healthy individual. The mortality is from 30% to 42·8%. Many cases are due to the spread of infective organisms from the oral cavity along the parotid duct to the gland, with invasion of the glandular tissue. Anatomical and bacteriological findings support the theory of ductogenous infection. In early cases the larger ducts are involved; in later cases extension through the smaller radicles involving periductal tissue occurs and later abscesses centring upon the ducts are found. It has rarely been shown that the organism recovered from the parotid corresponds to that of a focus elsewhere or to that of an existing general infection. In typhoid fever, however, the *Bacillus typhosus* has been found in the parotid usually as a factor of a mixed infection. In acute parotitis the organisms generally isolated from the parotid normally exist in an avirulent state in the mouth and lower part of the parotid duct, especially *Staphylococcus aureus*.

Factors favouring ascent of infection through the duct are many. The virulence of the normal bacterial flora of mucous surfaces is increased by lowering of resistance by infection and debilitation. Other factors are diminution of salivary secretion in febrile states or reflexly during surgical procedures from visceral manipulation; from dehydration due to vomiting and diarrhœa and trauma of the gland inflicted by unskilled anæsthetists. Claissé and Dupré tried to produce the condition in dogs by injecting organisms into the ducts, but caused suppuration only when they ligated the ducts or introduced foreign bodies into their lumens. F. Rost stated that he could with equal facility infect the parotid glands of dogs either by injecting hæmolytic *Staphylococcus aureus* into the ducts or the artery supplying the gland. In both cases the pathological condition was identical.

Berndt and his colleagues repeated Rost's experiments on dogs. In their first experimental group all but one of the parotid glands injected through the ducts with hæmolytic *Staphylococcus aureus* suppurated. Two of eleven injections into the superficial temporal artery resulted in recognizable inflammation. In the series of duct injections five were ligated. The histological picture in all five was the same, varying only in the degree of inflammation. Purulent exudate distended the ducts, especially in the larger channels, but diminishing in the finer radicles. In many places the suppurative process destroyed the duct walls and extended into the surrounding gland tissue. The cells of the intraductal exudate were almost wholly neutrophile; of the periductal exudate, monocytes and lymphocytes. The glandular tissue showed degeneration and necrosis, and in one instance abscess formation. The blood vessels manifested no change. Two duct injections were not followed by ligation; one of the

[1] *The American Journal of the Medical Sciences*, November, 1931.

glands manifested acute suppuration, the other gave no evidence of inflammation. When the nutrient artery of the gland was injected with bacteria, nine of the eleven glands manifested no pathological change, except that in one instance there was slight round-celled infiltration with vascular endothelial hyperplasia. In one dog, after bilateral arterial injection, an inflammatory reaction, limited to several lobules, occurred in each parotid. The inflammation was periductal with mononuclear infiltration. The smaller ducts contained neutrophile exudate. There was no destruction of the lining epithelium, and the larger ducts seemed normal. The intima of the arterioles showed swelling and hyperplasia. Evidently the parotid is more easily infected through the duct than through the blood stream, and the pathological picture in each mode of infection differs.

In a second group of seven dogs was noted the effect of ligation without bacterial injection. Also, to determine if local resistance of the gland were sufficiently lowered by bacterial toxins to allow ascent of infection from the mouth, the arteries were injected with a filtrate of a five-day bacterial growth. To make a coarse suspension of bacteria for arterial injection the organisms were agglutinated by incubation in serum before use. An arterial injection was made in a gland whose duct was ligated, and the opposite duct was injected with bacteria. Also a simple arterial injection and an unligated duct injection were performed. Additional evidence was furnished that the histological pictures in hæmatogenous and ductogenous parotitis differ. Simple ligation of the parotid duct was not followed by inflammatory change within four days. Injection of bacterial filtrate did not lower the resistance of the gland enough to allow invasion by organisms of the mouth and parotid duct. Inflammatory changes in the glands were not produced by injection of clumped bacteria.

R. P. Custer in the same journal mentions the possibility of lymphogenous infection of the parotid from the nose and throat, and also extension of infection from surrounding structures. He reports two cases. One was an acute suppurative parotitis during the course of amyloid nephrosis with hæmorrhagic enteritis. The infective process centred about the ducts. The causative organism was apparently a staphylococcus, but the clinical picture was not a staphylococcal septicæmia. Seemingly the enteritis was non-bacterial. The other case was associated with erysipelas of the leg. The infective process centred about the ducts. The erysipelas organisms suggested streptococci, but those in the parotid were staphylococci. In neither case did the blood vessels show any damage, nor were there embolic or thrombotic lesions. Both cases were fatal. Custer's conclusions are that the pathological features of ductogenous and hæmatogenous acute suppurative parotitis are dissimilar and that ductogenous infection is more easily induced. In blood-borne infections the small ducts are early involved and the large ducts later.

Post-operative parotitis occurs most often when the operation has been done in a septic field and may be manifested some days after operation. This has been deemed evidence of metastasis, but against such hypothesis is the fact that the organisms in the parotid are generally dissimilar to those of the septic area. Sudden onset with high fever and high mortality have been thought to indicate sepsis rather than local infection. The fact that, in most cases, the parotid alone and not the other salivary glands is affected may be construed as a predilection of this gland for organisms in the blood stream, as occurs in other tissues. Ductogenous infection is favoured in surgical and some medical cases by diminished salivary secretion owing to restriction of fluids. In general anæsthesia there is salivation during the early stages, but during the surgical stage and for some hours afterwards the flow is scanty or absent.

It is certainly curious that the parotid alone of the salivary glands should as a rule be affected, and Custer's suggestion really takes us nowhere. There is often seen an acute non-suppurating parotid swelling when diet is restricted, as in typhoid fever and after hæmatemesis. On the other hand, the condition may go on to necrosis or gangrene, especially after surgical operations. In adult influenza acute suppurative parotitis may occur with pneumococci in the pus and with or without staphylococci. Diminution of salivary secretion by morphine or atropine may predispose to parotitis. Suppurative parotitis is rare in mumps, but cases have been reported, one in an infant of two months, associated with *otitis media*. It may also be noted that salivary calculus impacted in the parotid duct, and less often in the ducts of the other salivary glands, may cause swelling, pain and tenderness in the obstructed gland, but not usually suppuration.

A MEMORIAL VOLUME TO THORBURN BRAILSFORD ROBERTSON.

SOME months ago attention was drawn in these pages to a book entitled "The Spirit of Research", consisting of a series of essays by the late Thorburn Brailsford Robertson, sometime Professor of Physiology and Biochemistry in the University of Adelaide. This volume was welcomed by Robertson's friends and colleagues, for it reminded them of the ideals which he sought, and of the motives which actuated him, while it also set up a standard for their emulation. His colleagues have now set up a memento to him by publishing a memorial volume of scientific papers. Robertson was for many years editor of *The Australian Journal of Experimental Biology and Medical Science*. The memorial volume, as is most fitting, is a special number of this journal. The volume has been edited by Sir Charles Martin and Mr. Hedley R. Marston. It contains papers from workers in Australia, Great Britain, Canada, Germany, Austria and Italy, and is a worthy tribute to a man of science.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Granuloma Annulare Disseminatum.

S. MONASH (*Archives of Dermatology and Syphilology*, January, 1932) reports having had under observation two cases of *granuloma annulare* which, in addition to the usual annular lesions, presented other interesting features which place them in a class by themselves. These were the presence of numerous discrete papular lesions, some of which later assumed an annular arrangement, the appearance on the face of erythematous areas, slightly, if at all, infiltrated and devoid of papular or nodular lesions, and the rapid dissemination of the diseased process as evidenced by the sudden outcropping of many discrete papular lesions. Biopsies of these various types of lesions all showed similar microscopical pictures. Intracutaneous tests with 0·0001 gramme of old tuberculin gave positive results in both cases, and a subcutaneous injection of 0·000001 gramme gave a positive result in one and no result in the other. Guinea-pig inoculations were without result, as also was staining of the tissues for acid-fast bacilli.

Chemical and Electrolytic Lesions of the Mouth Caused by Artificial Dentures.

E. S. LAIN (*Archives of Dermatology and Syphilology*, January, 1932) in a routine examination of the mouths of forty-five consecutive adults wearing full plate dentures revealed that 42% had either stomatitis or glossitis. It was found that many of these infections were due to neglected oral hygiene, malocclusion or trauma caused by imperfect adaptation of the plates to the alveolar process. In several cases, however, after all ordinary ætiological factors had been eliminated, it was concluded that the poisonous constituents of the dental plates were the offending agents. Analyses of the plates in two of these cases revealed porosity with free mercury sulphide and sulphur in one and aluminium powder with a trace of zinc in the other. Macroscopical and microscopical examination of other offending plates indicated "undercuring" with porosity. Each of thirty consecutive adults examined, whose mouths contained two or more metals of different potentialities, registered from one to forty degrees of galvanic current on the micro-ammeter. One metallic upper plate with amalgam fillings below registered a dangerously high degree of current. A large percentage of the patients complained of symptoms such as metallic taste, burning tongue and acute dental nerve sensations, or presented visible mucous lesions adjacent to or between metallic dentures from which, after a process of elimination, it was concluded that the ætiological factors were galvanic discharges. Control experiments were made outside of the mouth with various metallic dentures immersed in buffered solution (pH 6·2 to pH 7·2). Other tests were made inside the mouth between metals having the same electrical potentialities. The author states that further research is necessary before the dangers of electrical discharges can be fully evaluated.

Psoriasis and Exfoliative Dermatitis.

A. STRICKLER AND P. D. ADAMS (*Archives of Dermatology and Syphilology*, January, 1932), while engaged in research on the ætiology of psoriasis and exfoliative dermatitis, investigated certain phases of the chemical composition of the scales in these conditions. They state that the nitrogen, sulphur and mineral content of normal human epidermis as reported by several investigators is very variable. The ratio of sulphur to nitrogen in the scales from patients with psoriasis and exfoliative dermatitis varies from 1·0 to 14·3 to 1·0 to 19·5. It was found that as far as the content of nitrogen and sulphur is concerned, there is no striking difference between the scales of these conditions and those of normal epidermis.

A Hitherto Undescribed Disease of the Skin.

A. WHITFIELD (*The British Journal of Dermatology and Syphilis*, January, 1932) describes several cases for which he suggests the name of *dermatitis colonica*. The chief points of the eruption are: (i) It is generally slightly or markedly irritable. (ii) The borders of the patches show almost discrete flat red macules without noticeable alteration of the consistency of the skin; there was diffuse scaling in a finely "chapped" manner. (iii) Most important is the well defined telangiectasis visible with the simple lens. The eruption is always associated with a great predominance in the stool of varieties of streptococcus, sometimes with complete absence of the *Bacillus coli*.

Demodex Folliculorum.

S. AYRES AND N. P. ANDERSON (*Archives of Dermatology and Syphilology*, January, 1932), in the examination of seventeen cases of *acne rosacea* found the *demodex folliculorum* in moderate to large numbers either in pus from superficial lesions or in dry follicular scales, whereas it was absent from the pus in thirteen consecutive cases of *acne vulgaris*. Following the use of a strong antiparasitic ointment and the daily use of soap and water in twelve of the cases the *acne rosacea* was either improved or clinically cured in all instances. Accompanying the clinical disappearance of the lesions there was a corresponding diminution in the number of *demodex folliculorum* and in some cases a total disappearance of the organism. It is suggested that the demodex plays some part in the skin lesions of *acne rosacea*.

UROLOGY.

Neurophysiology of the Bladder.

J. R. LEARMONTH (*Brain*, Volume LIV, Part 2, 1931) treats of the neurophysiology of the human bladder by combining cases from the literature and original observations at operation. Analysing impulses carried by bladder nerves the author concludes: (i) Sensation of distension travels *viâ* sympathetic and parasympathetic routes. (ii) Pain sensation is the result of an impulse carried mainly by parasympathetic, partly by sympathetic fibres. (iii) Pain sensation in the posterior part of the urethra (at least in part) arises from parasympathetic fibres. (iv) Tactile and thermal sensation probably travels only by the parasympathetic route. (v) Micturition is reflex. Most, if not all, afferent fibres travel *viâ* the parasympathetic route. (vi) The parasympathetic provides motor fibres to the detrusor muscle. (vii) Motor impulses to the ureterovesical orifice, trigonal muscle and internal sphincter travel by the sympathetic. (viii) The sympathetic contains inhibitory fibres for the detrusor muscle. (ix) The parasympathetic contains inhibitory fibres for the internal sphincter. (x) Vasoconstrictor impulses travel *viâ* the sympathetic. With regard to the act of micturition, the author's hypotheses are briefly: (i) The mechanism of "the desire to urinate": An adequate stimulus is applied to the vesical musculature (distension of the bladder) and this leads to automatic relaxation of the internal sphincter. (ii) Voluntary micturition occurs through the voluntary relaxation of the internal sphincter *plus* the automatic contraction of the detensor muscle. (iii) Micturition is only a true reflex in infants and patients with "cord bladders". (iv) The centre for the origination and completion of the act of micturition lies in the second and third sacral segments, but some extraspinal synapses must exist through which the act may be initiated and completed. From his investigations he further concludes that motor fibres to the prostate and vesicles arise from the first lumbar segment and travel *viâ* the presacral nerve. The sensations constituting the orgasm are not due to contraction of the muscle of the *vesiculæ seminales* and an orgasm may occur without ejaculation. This condition exists in patients who have had a pelvic sympathectomy performed.

Ætiology of Prostatic Hypertrophy.

W. E. LOWTHER AND R. L. JOHNSTON (*Journal of Urology*, November, 1931) describe further studies of the ætiology of prostatic hypertrophy. Their experiments on rats lead to the following conclusions: (i) The pituitary gland is necessary for normal development of the testes. (ii) Testes are necessary for normal development of the prostate. (iii) Prostato-vesiculectomy has no effect on the testes. (iv) Castration invariably leads to atrophy

of the prostate and vesicles. (v) When testicular tubules are destroyed (by radium *et cetera*) an increase in interstitial tissues follows, and subsequently enlargement of the prostate takes place. (vi) Testicular tubules do not produce the male hormone, but they utilize it. From these conclusions the authors enunciate the following hypothesis: "Seminiferous tubules, in a sense, are accessory sex glands in a class with the prostate and their stimulation comes from the pituitary through the hormone, producing mechanism of the testis. In the absence of tubules, more anterior pituitary hormone is left free to act on the prostate and probably increase in interstitial cells would further facilitate its transmission to the prostate." The following practical applications of their findings are suggested: (i) Simple hypertrophy of the prostate (which has not become fibrotic) is benefited by suppression of the male hormone. (ii) Castration breaks the chain of the hormone mechanism, prevents further glandular proliferation and causes atrophy of preexistent glandular tissue. (iii) A less radical means of suppressing the male hormone is to be sought.

Uretero-Heminephrectomy in Infants.

M. F. CAMPBELL (*Journal of Urology*, September, 1931) claims to record the first two cases of uretero-heminephrectomy in infants. The patients were six years and twenty-eight months old respectively. Both had reduplication of the upper urinary tract, and operation was successfully undertaken for hemipyonephrosis. The author points out that infants stand urological investigation and major operations very well if the preparation has been thorough.

Transurethral Prostatic Resection.

R. DAY (*Urologic and Cutaneous Review*, May, 1932) reviews the numerous varieties of transurethral prostatic resection operations and the types of apparatus required. After pointing out that to some surgeons the method will never be satisfactory because of their temperament or lack of dexterity as technicians, he states his tentative opinion of the value of the operation thus: In 25% to 30% it is the operation of choice; in 10% it should be definitely refused. Of the remainder, he would share responsibility with the patient for choosing resection in one-third, while the remaining two-thirds would be required to take the whole responsibility for the choice.

Acquired Renal Dystopia.

FRANK KIDD (*Journal of Urology*, September, 1931) discusses acquired renal dystopia. He stresses the importance in ætiology of the "Egyptian" figure, lax abdominal muscles and "sprains" of renal ligaments, and he considers that an undetermined endocrine factor influences the disease. The large majority of movable kidneys should not be operated upon, and good results depend on a wise selection of cases. Kidd excludes all patients with severe splanchnoptosis, tuberculosis, chronic cough and heart disease, as well as confirmed neurasthenics. From the remainder patients for nephropexy are selected by four criteria: (i) Pain must be definitely of renal distribution. (ii) Pyelography must demonstrate a fixed kink or twist of the ureter as well as renal dystopia. (iii) Pyelography must demonstrate dilatation of pelvis and calyces. (iv) An infected ureteric catheter specimen is an additional reason for operation. The author's operation is illustrated and described.

Urethrography.

C. CARRIER (*Journal d'Urologie*, August, 1931) uses urethrography for the study of difficult lesions which involve particularly the posterior part of the urethra and the prostate gland. An opaque, oily solution is used, such as lipiodol or iodipin. On a twenty-five cubic centimetre syringe a suitable nozzle is placed and the fluid is injected. After fifteen cubic centimetres have been injected the picture is taken, the injection being gently continued meanwhile. The oil is now allowed to drop out of the canal, and then a second exposure is made.

E. LANGER AND C. ENGEL (*Zeitschrift für Urologie*, January, 1932) claim that urethrography is a reliable and easily applied method of diagnosis in diseases of the male urethra, particularly in strictures, wounds and malformations of the canal. Moreover, in diseases of the prostate and seminal vesicles a much clearer diagnostic picture is afforded than by other means, such as urethroscopy. The results have been so surprisingly informative that it is difficult to understand why this side of radiological diagnosis has been largely neglected till recently. Formerly the authors used a 20% iodipin solution for the injection, but now they use a preparation called "Thorotrast", which is a stabilized colloidal thorium solution, freely miscible with the urine. On account of the latter property it does not float on top of any little urine which may be in the bladder, but fills the organ uniformly and so gives the exact contour of the prostatic region of the bladder floor. Further, on account of its fluidity, it easily penetrates the ducts of the urethral adnexa and the smallest abscess cavities or fistulous channels. From 50 to 80 cubic centimetres are injected in all. The exposure is made when most of this amount has been injected, and the final portion is injected while the exposure is being made.

Excretion and Cystoscopic Pyelography.

L. CASPER (*Zeitschrift für Urologie*, October, 1931) discusses the particular advantages and limitations of intravenous as compared with cystoscopic pyelography as well as the absolute advantages and limitations of the former method. He is unconvinced that either method of pyelography can be relied on to differentiate tuberculous from other forms of renal suppuration. Again, in polycystic kidneys, it is claiming too much for pyelography to say that the appearances are characteristic and diagnostic. Both in tuberculosis and polycystic disease other and more certain means of diagnosis are available. Even with renal tumours one must be careful in the interpretation of pyelographic appearances. With small tumours no alterations of the normal picture may occur; on the other hand, an alteration suggesting a large tumour may be due to blood clots, inspissated masses of pus, pressure by neighbouring organs *et cetera*. In malformations and obstructive lesions of the kidney and ureter, however, intravenous pyelography possesses undoubted advantages as a diagnostic method. Deductions regarding the renal functional activity are to be drawn from excretion pyelograms only after the most careful consideration of all factors, particularly any possible obstructive factors, whether static or dynamic.

Renal Insufficiency in Enlarged Prostate.

T. KATZ (*Journal d'Urologie*, September, 1931) states that of 1,500 patients with senile enlargement of the prostate only 30 had less than thirty cubic centimetres (one fluid ounce) of residual urine. All of the patients except one had good renal function. This one patient had lowered renal efficiency in spite of the absence of residual urine, and the history is reported in detail on account of the rarity of the findings. Intravenous pyelography revealed dilatation of both calycal systems, but only of one ureter. Anatomical study by means of vesiculograms showed an extremely horizontal disposition of the seminal vesicles and ampullæ of the *basa deferentia*. Anatomical studies by Zuckerkandl and others in the past have shown that in such cases the stretched *vas deferens* pulls on the ureter at the point where it crosses this duct and leads to dilatation above this point.

Diagnosis of Malignant Bladder Growths.

T. H. REDEWILL (*Urologic and Cutaneous Review*, March, 1932) claims some success in the cystoscopic diagnosis of the degree of malignancy of bladder tumours. Using Ludford's observation that cancerous cells remain uncoloured with trypan blue while benign cells take a deep stain, he allows a 5% aqueous solution of the dye to remain in contact with the growth for ten minutes. Cystoscopic visualization of the growth then enables him to grade it according to the Broder's scale without biopsy. One fallacy, noted by the author, occurs when secondary malignant cells lie deeply in a benign growth and have not reached the surface. In that case the growth retains the appearance of a simple tumour.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at Geelong on March 19, 1932, DR. B. MILNE SUTHERLAND, the President, in the chair.

Spinal Anæsthesia.

DR. A. E. BROWN read a paper entitled: "Spinal Anæsthesia" (see page 674).

DR. LEO DOYLE complimented Dr. Brown on an eminently fair statement of the case for spinal anæsthesia. He congratulated him on being a pioneer in such work. He thought it was easy to overstate the advantages of spinal anæsthesia because in successful cases they were so great.

In his own technique he preferred the patient sitting up. The skin at the site of puncture was anæsthetized, and a large bore needle was used to puncture the skin. It was easy then to insert the finer short bevel needle through the resulting puncture without undue pressure. He also used ephedrine and a low Trendelenburg position for the operation. Dr. Doyle considered that it was a useful method of anæsthesia for patients who were very ill, for those with high blood pressure or pulmonary trouble, and in operations producing shock. He emphasized the comparative speed and ease of induction of this form of anæsthesia, and he agreed with Dr. Brown regarding the late advantages. One of his (Dr. Doyle's) patients had died on the table. Some such deaths were not due to the spinal anæsthesia. He had a theory as to the reason for fall in blood pressure, which, as far as he knew, had not been stated elsewhere. He was sure it was not due to splanchnic dilatation. He considered it was due to paralysis of three-fifths of the skeletal muscles, the loss of tone resulting in diminution in venous return to the heart. He suggested the use of Esmarch's bandages on the limbs to combat the fall in blood pressure.

It was important for the patient's emotional state that the theatre technique should be systematized and all fuss and noise eliminated. He thought that bad-tempered operators should not use the method.

Headaches, he considered, could be prevented by using the small needle, thus minimizing leakage of cerebro-spinal fluid, and the retention of the Trendelenburg position on the way back to the ward and until the patient recovered the use of his limbs.

He had never seen any nervous complications, and he considered preliminary narcosis unnecessary in the stolid type of patient. Brave but nervous patients might be robbed of their control by insufficient dosage. Anticipation was responsible for some evil emotional effects, and those patients who, owing to urgency, had not been warned of the type of anæsthesia proposed, had been calmer than the others.

The method was contraindicated, he considered, in patients with low blood pressure, disease of the central nervous system, coronary disease (found *post mortem* in one of his patients), in suspected or certain septicæmia, also in frightened patients and in operations above the umbilicus, owing to: (i) difficulty of obtaining high anæsthesia safely, (ii) desirability in operations on the upper part of the abdomen of using the reversed Trendelenburg position. Backache, he thought, was often a result of lying on a hard operating table, and would disappear if suitable cushions supported the patient.

DR. B. T. ZWAR congratulated Dr. Brown on his paper, which was the means of presenting the subject for discussion. He first saw spinal anæsthesia used in von Eiselsberg's clinic in Vienna in 1905, and was then much impressed by its apparent advantages. Later, in 1906, as Anæsthetist to Saint Vincent's Hospital, he tried the method and published his first results in the *Intercolonial Medical Journal of Australasia* in August, 1906. He was then an enthusiastic supporter of this method, but added experience, as reported to the Medical Congress in Melbourne, 1908, the result of its use in 278 cases, tended to change his attitude. This experience was not confined to "Stovaine", for of the 278 cases quoted, in 24 "Novocain" had been used, and "Tropacocaine" in five. In the subsequent cases, about 500, "Novocain" was the analgesic generally employed. At first, Billon's solution was employed, next "Stovaine" dissolved in cerebro-spinal fluid, then Barker's heavy glucose solution, and, lastly, the solution recommended by Jonnesco. As a result of his experience he felt that considerable advances were necessary before spinal anæsthesia could be used in any but exceptional cases.

He considered its drawbacks under two headings: First, the toxic effect of the analgesic employed and, secondly, the inability to limit the influence of the analgesic employed. As regards the first, toxic symptoms in the form of backache, headache, pareses and paralyses occurred in a certain proportion of cases. He felt that these did not depend on the technique, but on the drug employed. As proof of this he quoted a case in which the employment of spinal anæsthesia was followed by severe headache, backache and signs of meningeal irritation. Cerebro-spinal fluid withdrawn twenty-four hours after the injection was quite turbid and yielded a copious puriform deposit, consisting mainly of polynuclear leucocytes. A bacteriological examination showed the fluid sterile. It was possible that with a less toxic analgesic these disadvantages could be avoided. As regards the inability to limit the influence of the analgesic, Barker's heavy glucose solution was the first attempt to overcome this objection, but experience showed that it diffused just as readily as other solutions. He instanced an experience in which this solution was used in the case of an international athlete. The injection was made with the patient in the sitting position and the pelvis was raised for a short time subsequent to the injection. A spread upwards of the analgesic and paralysing effect took place with great rapidity. The intercostal muscles were paralysed very rapidly, and it was necessary to continue the operation whilst artificial respiration was being carried out on the patient.

Jonnesco's method of adding strychnine to the solution proved a failure in his own (Jonnesco's) hands when he attempted to demonstrate it in London. The experience with the "Spinocain" solution of Pitkin had shown that it did not allow segmental limitation of the effect of the injected substance. Kirschner, in experiments on animals and models, and from his experience with patients, had shown that "Spinocain" diffused rapidly in both directions after injection.

Dr. Zwar noted also the after-effects in his cases and that these occurred more often than generally stated by supporters of this method of analgesia. "Novocain" was frequently followed by annoying symptoms such as headache and backache and other signs of meningeal irritation. Paralysis or paresis of the *abducens* and peroneal nerves had been observed. Paraplegia had subsequently developed in one case in which the onset of nervous symptoms was a peroneal paralysis. The Wassermann test in this case gave a positive reaction, and doubtless the syphilitic condition influenced the determination of the lesion. Koenig also had reported a fatal case of paraplegia following spinal anæsthesia. Paralysis of the sphincters, chiefly the rectal, occurred as an after-result, but was usually temporary. Fall in blood pressure was common, but he had noticed that complications were less frequent in older people, whatever might be the reason for this. Kirschner's work supported Dr. Doyle's explanation of fall in blood pressure. Kirschner's method, which had for its object the segmental limitation of the analgesia, was worthy of consideration. He displaced the lower cerebro-spinal fluid by air, having first withdrawn a corresponding amount of the fluid. If first lumbar level of anæsthesia was desired, twenty to twenty-five cubic centimetres of cerebro-spinal fluid were withdrawn and replaced by air, with the patient in the extreme Trendelenburg position. Then he injected a solution of analgesia into the lower part of the air level. This analgesic was of such composition that it floated on top of the cerebro-spinal fluid for one to two hours. Kirschner used "Percaine", but the important point in his analgesic solution was not the analgesic itself, but the make-up of the solution. Kirschner claimed that with the employment of his method there was no fall of blood

pressure, that there was an absence of meningeal irritation and of other disadvantages, and that he was able to limit the area of analgesia. Dr. Devine, of Melbourne, had used this method successfully on several occasions. The solution recommended by Kirschner was supplied in the form of ampoules from "Ciba", the Society of Chemical Industry in Basle. A special syringe for withdrawing the cerebro-spinal fluid and for the injection of air and the spinal analgesic solution was made by Erbe, of Tübingen.

Dr. Zwar concluded that after his own experience, and bearing in mind the perfection of other methods of anæsthesia, he had not used spinal anæsthesia for about twenty years, gas and oxygen or ethylene being preferred in critical conditions. With these methods of anæsthesia available he would not himself submit to the administration of spinal analgesic provided he was sufficiently conscious to refuse it. This being his view, he felt that he could not use it on his patients. He realized, however, that in country centres conditions might obtain in which its use occasionally was justified, and for this reason he considered it desirable that every effort should be made to improve this special form of anæsthesia.

DR. JOHN DALE asked Dr. Brown if he considered the skeletal muscles used during parturition of sufficient importance to influence the use of spinal anæsthesia in midwifery.

DR. S. O. COWEN referred to the dose of fifteen grains of "Luminal" mentioned by Dr. Brown—four and a half grains in four hours was considered a safe dose. It was the most intensely toxic of the barbituric acid group of drugs. Erosion of mouth and skin and degenerative changes in the central nervous axis had been reported following its use. "Medinal" barbitone-sodium was the safest. A patient for whom he ordered chloretone over the telephone, was given barbitone, fifteen grains, at night and again in the morning. She was in a state of stupor, her tonsils were removed without further anæsthesia, and complete amnesia for the operation and succeeding hours followed. Dr. Cowen asked if Dr. Brown had found "Luminal" in those doses more dangerous.

DR. R. P. MCMEEKIN, referring to Dr. Cowen's remarks, said that a patient he saw was given "Luminal", twelve grains, and was for thirty-six hours *in extremis*, his life being saved with difficulty. He would not be inclined to give fifteen grains.

DR. A. E. COATES had employed spinal anæsthesia in twenty cases during the last three years. He injected through the second lumbar space and obtained one and three-quarter hours' effective anæsthesia. In his opinion, the fall in blood pressure was due to capillary dilatation of generalized distribution. He had taken thermopilic records of the temperature of the limbs during spinal anæsthesia. In all cases tested there had been a rise in temperature, showing that an increased blood flow and not venous stasis occurred. He considered that, particularly in old people, spinal anæsthesia was the anæsthetic of choice in all cases of intestinal obstruction due to some urgent abdominal condition, such as strangulation of the intestine by adhesions, and would limit its use to such cases. The relaxation of the abdominal muscles was better, there was speedy recovery of peristalsis in the affected bowel, the peristalsis being visible during operation, and also there was less risk of inhalation of vomitus by such patients, who were usually very ill. There was a danger in spinal anæsthesia, where mistaken diagnosis led to its use in perforation of a hollow viscus, appendix or gastric ulcer, for example, owing to the early peristalsis. In such cases spinal anæsthesia was definitely contra-indicated. Regarding pulmonary complications, his opinion was that they were due to embolism rather than to the anæsthetic used. They occasionally occurred when local anæsthesia had been used.

DR. J. S. GREEN recalled a case of pregnancy with albuminuria which was terminated under spinal anæsthesia. The patient died during the manipulations. He thought it possible that the stretching of a sphincter muscle might have been responsible, enervation of such being different from that of skeletal muscle. He asked Dr. Brown whether he had had any reason for perturbation during the stretching of sphincters in operations such as for hæmorrhoids.

DR. KEITH HALLAM desired to warn surgeons against large doses of "Luminal" in association with spinal anæsthesia. He had used it intravenously in doses ranging from four grains to fifteen grains under the direction of Dr. Newman Morris. He had taken the blood pressure every three minutes and the fall had alarmed him, in one case reaching 76 millimetres of mercury. He thought "Luminal" was contraindicated.

DR. H. G. FURNELL stated that at the Alfred Hospital, in Dr. Fowler's clinic, spinal anæsthesia was the choice in practically all his gynæcological operations during the last three years, and was most successful. Relaxation was good and after-effects negligible, with the exception of occasional slight headache. Possibly their good experience was associated with their preliminary medication. One and a quarter hours before operation morphine, one-quarter of a grain, and hyoscine, one one-hundredth of a grain, were given. A quarter of an hour before, morphine, one-sixth of a grain, hyoscine, one one-hundred-and-fiftieth of a grain, were given, and one cubic centimetre of ephedrine solution on the table. Two cubic centimetres of "Novocain" solution were injected and gave anæsthesia of one and a quarter hours' duration. Two cubic centimetres of 0·5% "Percaine" solution had also been used, giving definitely longer anæsthesia. Under those conditions spinal anæsthesia seemed perfectly safe.

DR. B. MILNE SUTHERLAND said it was not denied that spinal anæsthesia had a definite sphere of usefulness, but Dr. Brown advocated it in districts where it was difficult to get special forms of anæsthesia, namely, with practitioners only "doing odd cases". Many doctors in country districts were diffident about doing ordinary lumbar punctures. How much more so would they be with the technique of spinal anæsthesia. He considered that advocacy of its use created a definite danger, because a surgeon should be very conversant with the method he used. In spinal anæsthesia they were dealing with a cavity of the body highly protected by Nature for excellent reasons. He certainly did not concur in its use for minor operations, such as varicocele, hernia *et cetera*. The cases of intestinal obstruction cited by Dr. Coates were recognized everywhere as suitable for spinal anæsthesia. He had seen spinal anæsthesia from its inception, with Barker, in Melbourne, and in Vienna five years previously. There was always an objection unless the patient was desensitized. At any rate, British people objected to being placed in certain positions while conscious. In maternity work there were better methods available. "Sodium Amytal", "twilight sleep" or "Avertin" were just as efficient and less dangerous. In Vienna there were two rival clinics, the Wertheim and the Shortes clinic. In the former it was frequently necessary to finish operations under general anæsthesia. Patients were sent to Budapest suffering from various after-effects, such as rheumatic pains, relaxation of sphincters and paresis.

Dr. Brown in reply said he was gratified at the amount of discussion his paper had evoked. There were few points requiring answer. He agreed with most of the comments, including those of Dr. Zwar, although he was not so afraid of the method as perhaps were those of more experience. He had not met with any pulmonary complications. McKillrick stated that they were not lessened in spinal anæsthesia. High blood pressure patients fell further and suffered most thereby. The least fall of blood pressure was noticed in those with moderate pressure—rarely more than ten millimetres of mercury. Dr. Zwar stated that backache was due to irritation by the drugs injected; he could offer no opinion, so little were either backache or headache noticed nowadays. Headache he always effectively combated with magnesium sulphate given *per rectum*. Kirschner's method was interesting and was an instance of the requirements to be expected before the method was made safer. Young patients had given neither McKillrick nor himself any trouble. In reply to Dr. Dale, his obstetric patients had been few, but grateful. Labours had not seemed to be affected adversely by the absence of skeletal muscular effort.

He was glad he had not known of the dangers of "Luminal" earlier. He had used it on the authority of one of the Mayos who had given thirty to fifty grains without death occurring. He found that ten grains had little effect and the patients were apprehensive; fifteen grains made them pleasantly drowsy. He had not used "Medinal".

In reply to Dr. Green's query, he could only endorse the Alfred Hospital findings as recounted by Dr. Fernall.

Dr. B. Milne Sutherland had remarked on the dangers attendant on the method. Although the risks were always present in people's minds since the days of King George V Hospital work, he did not think they were so great as imagined. He had seen only one case of Barker's in 1910 or 1912 that had been accompanied by bad effects. There was no more danger than with ordinary lumbar punctures. Country medical men should be efficient enough to perform the latter with impunity; if not, they would probably be inefficient with administration of ether. The use of spinal anæsthesia in maternity work seemed to him just another way of giving comfort in a time of trial, and he was not impressed with the dangers of it.

Common Diseases.

DR. L. E. HURLEY read a paper entitled: "Some Remarks on the Early Phenomena and Natural Course of a Few Common Diseases" (see page 679).

After thanking Dr. Hurley for an interesting and stimulating paper, DR. N. A. ALBISTON referred to his early remarks regarding patients with few or no symptoms. Patients did not present themselves unless they had symptoms, except for insurance and similar examinations or following recovery from illness, as a means of insuring the early recognition of sequelæ. In such cases, as in others, the symptoms and signs looked for by the physician were those he had already learned to associate with disease processes. Doubtless something akin to genius was required today to discover new signs or symptoms, though he had little doubt they were often present. He suggested that the very early manifestations of disease were often to be found in a realm of symptomatology of which the majority of medical men had little cognizance, namely, the psychological and sociological section. Patients became habituated to slight, insidious alterations in such factors, regarding themselves as normal, yet questioning might elicit information of emotional difficulties, of undue fatigue, of changes in attitudes and interests that would justify more thorough physical examination. He stated that experience in mental hospitals taught how much mental trouble was associated with toxæmia from sinuses, tonsils and other local infections that had frequently been overlooked before breakdown occurred. He instanced the early character changes of general paralysis of the insane. Dr. Hurley had referred to certain psychological factors associated with epileptic tendency. In illustration of the psychogenic factor in such cases he cited the history of a man with daily epileptic attacks, chiefly of *petit mal*, associated with automatisms which had existed for five years. For four years he had been treated by the usual methods in the out-patients' department without relief. Six months ago, while attending Dr. Maudsley's clinic, he was treated by psycho-analysis, in which a psychic trauma of nine years previously was recalled. He had been perfectly well since. The burden of these remarks, of course, was that until psychology was introduced into the medical curriculum, the medical practitioner in Victoria would be handicapped in the early detection of disease.

DR. W. KENT HUGHES said that of course prevention was better than cure. He had been disappointed with the results of medical inspection in schools. What results had followed? Dr. Dale and he a few years ago examined three hundred children of pre-school age, out of which number one hundred were found to be physically below normal. It was necessary for them to study the pre-school child; only so would they effect much in the way of prevention of disease.

DR. J. DALE expressed his gratitude to Dr. Hurley as a chief of preventive medicine. Dr. Victor Hurley had mentioned the subject years ago in an address, but nothing had been done. He hoped that no one would say what had been said by a medical man of psychiatry a few days ago: "Preventive medicine, if there be such a thing!" It would be profitable to prevent disease from a scientific and sociological point of view if from no other. There was a demand by the public for something to be done, but economic factors made it difficult. It would be deplorable were a separate branch of the profession formed to deal with prevention while another branch was interested only in cure, as obtained in some countries, because the profession as a whole could deal with the problem. There was an effective insurance scheme in England which must improve preventive medicine. He could not help wondering how many of them had that relation with their patients whereby they agreed for a certain sum *per annum* to prevent disease in their families as far as they were able by periodic examination. He hoped it would be endorsed by the profession, and the necessary arrangements made for members regarding fees *et cetera*.

DR. S. O. COWEN said they were greatly in Dr. Hurley's debt both for the care in the preparation of his paper and also for the fruits of personal experience it offered. Unfortunately, it was too late for adequate discussion. Dr. Hurley's conclusions differed somewhat from his own, and progress came through discussion of differences of opinion. Regarding rheumatism and its sequelæ, Swift's concept that the pathological manifestations could be divided into: (i) proliferative, for example, Aschoff's bodies in the heart; (ii) exudative, for example, joint lesions. In the Aschoff bodies resided the virus, and its persistence explained the recurring features of rheumatism. The question of the specificity of salicylates was illuminated by Swift's conception, affecting the exudative lesions very well, but having no effect on the proliferative. The apparently spontaneous late heart lesions thus were also explained.

He differed from Dr. Hurley in that compensation did break down, for example, as a result of damage to the myocardium by an undercurrent infection, such as influenza.

Regarding tonsillectomy in acute rheumatism, he again differed as to its utility in preventing complications. He considered it did prevent them. In advanced heart disease too he disagreed and believed that tonsillectomy should be done, although this was at variance with published statistics and other experience. He agreed as to the necessity of rest, but it was difficult to get it carried out.

DR. L. S. LATHAM appreciated the evidence of thoughtful medical practice and the consistent analysis of his cases revealed by Dr. Hurley in his paper.

Sir James McKenzie's dictum was generally accepted that functional disturbance preceded detectable structural change, therefore attention to the former was necessary in early detection of disease. They had reached the stage in medicine where analysis of symptoms themselves had become desirable.

Treatment that played for safety was only difficult to impose for economic reasons; patients were unable to submit to it when it involved long rest and abstention from work by wage-earners.

DR. C. JAMES wished to emphasize what Dr. Latham had just said regarding the influence of economic factors. He had examined 150 to 300 children, of from fourteen to sixteen years, entering employment in Geelong. Many of them were not really fit, yet it was urgent that they should commence earning wages. The question had worried him a great deal. The school medical officers and dental clinics had produced marked improvement in the last five years, nevertheless there were children who were the sole support of families and who were consequently undernourished and a prey to disease. He thought they should be made fit before employment. Chronic disease otherwise would be only too manifest in years to come.

Dr. Hurley in reply thanked those entering the discussion. He had no actual questions to answer. He was sure Dr. Cowen's disagreement with him was the result of the limited time available for him to elaborate the various points in his paper. Regarding the Aschoff bodies, he agreed, but that conception did not militate against his contention that infection might wake into activity; rather, it supported it.

Regarding compensation, he referred to patients presenting no appreciable signs of heart involvement. Even mitral stenosis did not, as a rule, place the heart under insuperable difficulty unless it became extreme. The idea of compensation was most usefully applicable when serious organic damage was really done. Where the myocardium or valves were damaged, future prospects were impaired and compensation made more difficult of achievement.

Regarding tonsillectomy, he agreed that, done early, it was beneficial, but after heart disease was established tonsillectomy could not benefit it, although it might prevent further infection. With Dr. Albiston, he agreed that it was difficult to obtain a history of symptoms. His own policy was not to allow a patient to ramble on, but to take one symptom at a time and find out from the patient all he could tell concerning it before passing to the next. There was still greater difficulty in obtaining psychological evidence.

NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

Clements, Nathan John, M.B., B.S., 1930 (Univ. Sydney), 66, Arthur Street, Randwick.
Hughes, Norman William Michael, M.B., Ch.M., 1926 (Univ. Sydney), 41, Suttie Road, Double Bay.

The undermentioned have been elected members of the Victorian Branch of the British Medical Association:

O'Connor, Joseph Lionel, M.B., B.S., 1931 (Univ. Melbourne), Saint Vincent's Hospital, Fitzroy, N.6.
Fitzgerald, William Edward, M.B., B.S., 1929 (Univ. Melbourne), Children's Hospital, Carlton, N.3.
Alexander, Robert Clement, M.B., B.S., 1931 (Univ. Melbourne), Homœopathic Hospital, Melbourne.
McComas, Edith Elizabeth, M.B., B.S., 1930 (Univ. Melbourne), 29, Mary Street, Hawthorn, E.2.
Matheson, William Harlow, B.A., M.B., M.S., 1923 (Univ. Melbourne), St. Arnaud.

Public Health.

CANBERRA CANCER CONFERENCE.

THE Third Cancer Conference was held at Canberra on March 29 to 31, 1932. The meetings were held in the Institute of Anatomy. At the opening session the chair was taken by the Honourable C. W. C. Marr, Minister for Health of the Commonwealth. Subsequently the chair was occupied by Dr. J. H. L. Cumpston, Director-General of Health.

The delegates to the Conference comprised the following:

Commonwealth Department of Health: Dr. J. H. L. Cumpston, C.M.G., Director-General of Health; Sir W. Colin MacKenzie, Director, Australian Institute of Anatomy; Dr. M. J. Holmes; Mr. A. H. Turner, Physicist, Commonwealth Radium Laboratory, University of Melbourne.

New South Wales: Dr. F. P. Sandes, representing the University of Sydney Cancer Research Committee and the British Medical Association, New South Wales Branch; Dr. H. G. Chapman, Dr. Wm. H. Love and Mr. T. Wilkins, representing the University of Sydney Cancer Research Committee; Dr. Sylvia Bray, representing Sydney Hospital; Dr. E. H. Molesworth, Dr. J. Gower Stephens, Dr. A. T. Nisbet, Dr. Leila Keatinge, Dr. Constance D'Arcy, Dr. W. Moppett.

Victoria: Dr. C. E. Eddy, University of Melbourne, representing Professor T. H. Laby, F.R.S., Commonwealth Adviser in Radium; Dr. Hamilton Russell and Dr. T. F. Ryan, representing the Royal Australasian College of Surgeons; Dr. Kaye Scott, representing the Melbourne Hospital; Dr. W. G. Cuscaden, representing the Women's Hospital; Dr. N. Tracey Bull, representing the Austin Hospital; Dr. Thomas Cherry, University of Melbourne.

Queensland: Dr. L. M. McKillop, representing the Queensland Cancer Trust.

South Australia: Dr. F. S. Hone, representing the Committee of the South Australian Anti-Cancer Campaign and the British Medical Association, South Australian Branch; Dr. H. A. McCoy and Dr. S. Roy Burston, representing the Committee of the South Australian Anti-Cancer Campaign; Dr. B. S. Hanson, Adelaide Hospital.

Tasmania: Dr. V. R. Ratten, representing Hobart Public Hospital; Dr. W. P. Holman, representing Launceston Public Hospital.

The Editor of THE MEDICAL JOURNAL OF AUSTRALIA was present.

In opening the Conference the Honourable C. W. C. Marr welcomed the delegates to Canberra. He emphasized the importance of cancer research and spoke of the progress made in methods of treatment. He also expressed the willingness of the Commonwealth Government to do what lay in its power to make further progress possible.

Developments in Connexion with Cancer Control.

DR. M. J. HOLMES (Commonwealth Department of Health) gave a *résumé* of the developments in connexion with cancer control during the last twelve months.

In regard to the general organization for the control of cancer, he pointed out that the University of Sydney maintained its affiliation with the British Empire Cancer Campaign through the office of the High Commissioner for Australia. The University of Sydney had handed over to hospitals special control over matters of detail concerned with cancer treatment. This would result in reorganization and an attempt would be made to bring all patients with cancer in the hospitals under the purview of the consultative committees. The Sydney organization was finding the greatest difficulty in bringing about sufficient coordination between research workers and those engaged in the treatment of patients. Apart from a change in the Directorship of Cancer Treatment and Research in South Australia, no change had occurred in the organization in the other States.

Provision of Treatment Facilities.

As far as the developments in connexion with the provision of treatment facilities were concerned, Dr. Holmes said that a complete audit of Commonwealth radium was being made. In most centres the precautions taken in connexion with the use of radium were adequate, but there were instances in which practically no effort had been made either to safeguard the radium or protect the workers. If this state of affairs continued, the withdrawal of the radium would have to be considered.

In New South Wales great difficulty was being experienced at the Royal Prince Alfred, Saint Vincent's and Sydney Hospitals in coping with the treatment of patients who presented themselves. It might become necessary to enlist the cooperation of other large hospitals.

At Saint Vincent's Hospital, Melbourne, a new building was being put up for the radiological department; an account of the measures taken in connexion with this building is given later on.

In other States a certain amount of progress was being made and details of hospital accommodation were given by Dr. Holmes.

Consultative Treatment Committees.

Dr. Holmes gave details of the consultative treatment in the several States. In New South Wales and South Australia the work of the committees was consistent and satisfactory. At Brisbane a consultative clinic was still in operation, but the clinical meetings were not regularly attended. At Launceston consultations were readily arranged between the Medical Superintendent (who carried out the treatment), the radiologist and the honorary surgeons. In Victoria no definite clinics had been established. Dr. Holmes at this point referred to the value of consultative clinics in determining the type of treatment best suited to each patient.

Case Records System.

In discussing case records systems, Dr. Holmes said that the case records system decided upon at the last conference had been given a thorough trial at Sydney, but had not

proved entirely satisfactory. New case records would have to be designed.

Statistical Summaries.

Dr. Holmes referred to the necessity for careful filling in of Forms A and D with the results of treatment. In some centres the returns were compiled in such a way that the information contained in them was valueless. From other centres the statement had been received that the results of treatment could not be supplied because patients were not followed up sufficiently. The importance of the collection and analysis of the results of treatment was too obvious to require any emphasis. Treatment centres were under agreement to supply the information, but Dr. Holmes held that the value of the information should in itself be sufficient inducement to treatment centres to take some trouble in its accurate preparation.

Follow-Up Systems.

Generally speaking, the following up of patients was being well attended to in most centres. At the Melbourne Hospital only 7% of the patients treated since 1928 had been lost sight of. In Sydney the figure was 15%. Dr. Holmes gave no figures for any of the other centres. He referred to the need for a general following up of patients so that the results of radium treatment could be compared with those obtained by other methods.

Protection of Personnel.

Dr. Holmes pointed out that following on the report of the protection committee at the previous (the second) Cancer Conference on the protection of personnel, the position was much better than it had been. Reference was made to this subject at a later stage of the proceedings of the Conference.

The Use of Radon.

In Sydney an improved apparatus had been prepared for the preparation of radon which would be quicker and comparatively safe to handle. The quantity issued during the past year was 2,040 millicuries. Radon had been supplied to the Queensland Cancer Trust since 1931.

In Victoria radon had been supplied by the Commonwealth Radium Laboratory to the Melbourne Hospital, the Alfred Hospital, the Women's Hospital, the Austin Hospital, the Ballarat Hospital, Saint Vincent's Hospital, and the Homœopathic Hospital. The total supplied was 17,021 millicuries. This represented an increase of 43% on the amount issued in the previous twelve months. In South Australia a supply of 110 millicuries of radon per week was available from the University of Adelaide. Supplies of radon were not yet available in Tasmania and Western Australia. Dr. Holmes gave some details of the work with radon at some of the centres and said that the superiority of radon over radium for much of the general work was demonstrated by the increasing amount used.

Screenage of Radium Containers.

Reference was made to the question of screenage of radium containers. The general impression was that greater filtration was necessary.

Educational Aspects.

Dr. Holmes reviewed the educational aspects of cancer control, first, from the post-graduate and undergraduate points of view and, secondly, from that of publicity. These were referred to at a later stage of the conference.

Conclusion.

Dr. Holmes concluded his review with the following statement:

The year shows a great record of progress. Treatment facilities have been expanded both in respect of accommodation for patients and the provision of additional treatment apparatus.

In the past three and a half years to December 31, 1931, more than 9,000 persons have received treatment with radium at the several treatment centres for various malignant and other conditions. The exact number is not known owing to failure on the part of some of the treatment centres to supply their figures.

Of 3,031 patients treated for carcinoma (excluding rodent ulcer) in all stages of the disease in the three years ended June 30, 1931, 2,000, or 36%, are alive and free of symptoms; 22% are known to have died of cancer.

Of 1,265 patients with carcinoma classed as operable, 54% are alive and free of symptoms. Only 4% are known to have died of cancer, but in 23% information as to the subsequent history of the patient is not available.

Although considerable advance has been made in many hospitals in the elaboration of a system for following up patients after treatment, this figure of 23% of patients with operable carcinoma regarding whom subsequent history is not available, is much too large and a necessity is indicated for greater reliability in the follow-up system adopted at some of the hospitals. At some large hospitals the number of patients lost sight of is below 7%, and this is a figure which is attainable by all.

More attention is necessary also in the matter of the recording of cases and the preparation of statistical returns of the results of treatment. Some hospitals were unable to give information regarding results of treatment owing to the defective nature of their follow-up system; others who had the information available, supplied it in such a way as to be valueless for comparative purposes.

The matter of the protection of the personnel handling radium has received particular attention following the work of the last conference. The situation in this respect has greatly improved. Some hospitals, however, are still lacking in the attention given to this important matter.

The increasing use of radon and its evident advantages for employment in the treatment of cancer in many situations is one of the major developments of the year.

Unremitting attention has been given to the problems of X ray therapy, and this is a matter the discussion of which will occupy a considerable part of the time of this Conference.

The cooperation of Australia in the international inquiry into cancer of the *cervix uteri* has been advanced further, and a number of gynæcologists in Australia are now engaged in this important investigation.

After Dr. Holmes had completed his survey, a discussion took place on the question of screenage, and it was resolved:

> That a committee consisting of Mr. Turner, Professor Sandes, Dr. McKillop, Dr. Cuscaden, and Dr. McCoy consider and report in due course on the matter of increasing the screenage of radium and radon containers.

Cancer Statistics.

Mortality Rates.

Dr. Holmes pointed out that for the year 1930 the deaths from cancer in the Commonwealth per 100,000 of mean population were for males, 96; females, 94; persons, 95. These rates compared favourably with those for the year 1929, which were: males, 101; females, 95; persons, 98. Similar fluctuations in the mortality rate were not unusual and no special significance could be placed on the fall in the rates for 1930, unless this fall was maintained in subsequent years.

It was of interest, however, to note that the decline applied to all States except one. In New South Wales the mortality rate had varied but little in the past seven years, the rate for 1930 (92 per 100,000 of mean population) being the lowest recorded in that period. Queensland continued to show a mortality rate from cancer considerably lower than that of the other States in the Commonwealth.

Although the year 1930 showed a decline in the cancer mortality rate for the Commonwealth per 100,000 of mean population, of the total deaths from all causes the proportion which was due to cancer still continued to rise. Thus among males one death in every 9·8 and among females one death in every 8·1 was caused by cancer in 1930, this proportion being the highest yet registered in the Commonwealth.

Neglecting the population under the age of forty years in which death from carcinoma seldom occurred, the

mortality statistics showed that in males dying after the age of forty one death in every eight was due to cancer and in females one death in every six.

The steady rise in cancer mortality rate which had been apparent for many years, mainly appears in carcinoma of various organs. The mortality rate from sarcoma was now practically at the same figure as had been recorded twenty years ago and had shown relatively little fluctuation in the interval.

As regards regional cancer, mortality from cancer of the tongue in males showed a very definite decrease. The rate per 100,000 of mean population in 1908 was 3·9; in 1930 it was 2·7.

Whereas in 1908 one death in every seventeen deaths from cancer was due to carcinoma of the tongue, the proportion in 1930 was one in thirty-five. In females (among whom cancer of the tongue was relatively rare) there had been no corresponding diminution in mortality rate, but rather an increase.

In no region except that of the tongue did a diminishing mortality rate for cancer appear.

In respect of some regions, however, the mortality rate had increased much more rapidly than in others.

Thus in females the mortality rate from carcinoma of the breast had increased at a much faster rate than that for carcinoma of the female genital organs. This is indicated by the accompanying table.

Site.	Rate per 100,000 of Mean Population (Females)		
	1908.	1930.	Increase.
Female genital organs	15·3	17·9	17%
Breast	10·2	16·5	61%

The region in which the most rapid increase in the mortality rate from cancer had occurred was the digestive tract (œsophagus to rectum). Here the increase since 1908 had been approximately 100% in males and 80% in females.

The mortality rate for males per 100,000 of mean population in 1908 was 25·2; in 1929, 51·4; and in 1930, 49·7. For females the rate was 20·1 in 1908, 34·3 in 1929, and 35·9 in 1930.

In males one death in every 1·9 deaths from cancer was attributable to cancer of the digestive tract. In females the proportion was one in 2·6.

In cancer of the skin the mortality rate, which until 1918 steadily rose, had shown since that date a distinct, though fluctuating tendency to fall. In 1918 the mortality rate from cancer of the skin was 5·0 per 100,000 of mean population. The rate for 1930 was 4·0 per 100,000.

Records of Cancer Treatment Centres.

In discussing the records of cancer treatment centres Dr. Holmes said that the records of results of treatment were kept on uniform lines, enabling the statistical material to be consolidated. The period covered by these returns was only three years, and this period was not long enough to enable detailed conclusions to be drawn as to end-results of treatment. One or two wide facts of interest could, however, be indicated.

In a period covering approximately three years to December 31, 1931, the total number of patients treated by means of radium or radium combined with some other method by treatment centres associated with the national organization for the control of cancer in Australia was 9,431. Of these 4,025 were treated for carcinoma, 3,011 for rodent ulcer, 247 for sarcoma, 271 for conditions such as endothelioma, melanoma, teratoma and conditions of doubtful malignancy. The remainder suffered from benign tumours or other non-malignant conditions.

These figures did not include any cases of cancer in the treatment of which radium was not used.

Of 3,031 patients with carcinoma treated by means of radium or radium combined with some other method up to June 30, 1931, 36% were alive and free of symptoms at the end of 1931, 22% were known to have died of cancer and in 17% of cases information as to the end-result was not available.

Of 1,265 patients with operable carcinoma 54% were alive and free of symptoms, 4% were known to have died of cancer, but in 23% of cases the end-result had not been ascertained.

In regard to sarcoma, 45% of the patients with operable and borderline conditions treated during the three years up to the end of June, 1931, were alive and free of symptoms at the end of 1931, whereas, of those with inoperable conditions, 17% remained alive and free of symptoms.

Results of treatment by means of radium and radium combined with other methods were good in the case of cancer of the skin and of the lips and in operable tumours of the buccal cavity, uterus and breast.

In a large proportion of cases, however, varying from 29% of patients suffering from cancer of the skin and 30% of those with rodent ulcer to 7% of patients suffering from cancer of the buccal cavity, the end-results of treatment had not yet been ascertained.

The information which was being gathered was becoming more accurate, and with greater application in ascertaining the end-results of treatment and with the increasing length of the period elapsing since treatment was given, records would be available of the greatest value in enabling deductions to be drawn as to the true value of the various methods of treatment in cancer of different regions.

Cancer Research in Australia.

DR. H. G. CHAPMAN (Sydney) reviewed the research into the causation, the nature and the treatment of cancer which had been carried out in the Commonwealth during the last twelve months. He said that in Victoria Dr. Thomas Cherry had carried on his investigations into the relationship between cancer and tuberculosis. His interest during the last twelve months had centred mainly round tumours and ulcers of the pyloric region. Forty examples of such conditions had been found in mice inoculated with tubercle bacilli, and only two had been found in the controls.

At the Walter and Eliza Hall Institute for Research some observations had been made by M. Freeman, H. F. Holden, W. W. Lemprière, R. Kaye Scott, F. E. Williams, and C. H. Kellaway on the Bendien test for cancer. This investigation was reported in THE MEDICAL JOURNAL OF AUSTRALIA of December 19, 1931.

At the Baker Institute investigations had been carried out by R. Fowler, A. J. Trinca and R. A. Willis. Dr. Fowler had supplemented the irradiations of malignant growths in human beings by intravenous injections of "Uranin" (sodium fluorescin) according to the suggestion of Copeman, Coke and Goldesbrough; it was too early to speak of definite results. Dr. Trinca was comparing the effects of radium and radon, particularly in cancer of the breast; he was also studying the factors underlying natural immunity to transplanted cancer in mice with the object of testing the hypothesis that the particular type of process produced by radium furnished a specific antigen. Dr. Willis was continuing his studies of the modes of dissemination of malignant tumours in the human body. He hoped that it might be possible to obtain information regarding the chemical requirements and biological properties of tumour cells.

According to reports received from Perth, extended use was being made of combined methods of treatment—deep X ray therapy and surgical operation.

Dr. Chapman then went on to describe the work being carried out at the University of Sydney. He referred to the investigations of Dr. Warnford Moppett on the relation between the effects of X rays on various tissues, including clinical material, and the reaction obtained by him when the chorio-allantoic membrane of the chick embryo had been exposed to homogeneous radiations. Dr. Chapman also described experiments carried out by Dr. Moppett illustrating the extraordinary potency of homogeneous radiation. To facilitate the measurement of doses of X rays Dr. Moppett had constructed a thermo-electric instrument to record the rise of temperature when radiation was totally absorbed by a bismuth plate. With this instrument the Solomon and international units of X ray doses had been evaluated in ergs and variations of X ray

energy dependent upon changes of potential and milli-ampèrage had been investigated. Dr. Warnford Moppett and Dr. G. Harker had carried out experiments with sodium iodo-acetate on tumour-bearing mice. They had repeated the experiments of Lundsgaard, who showed that iodo-acetic acid in low concentration, while having little effect on the oxidative metabolism of carbohydrates, exercised a powerful inhibitive effect on the fermentative or glycolytic metabolism. Dr. Moppett and Dr. Harker had given the iodo-acetate orally instead of by injection. They had found that no iodo-acetate was absorbed by the tumours.

Dr. Chapman referred to the work of Mr. W. B. S. Bishop on the effects of irradiating cholesterol with radium, the work of Miss W. R. Mankin on the spectra of dried tumour tissue and of dried egg white, of Dr. Elinor Hunt on the effects of radium on the chorio-allantoic membrane of the egg, previously investigated by Miss Goulston, and to the work of Dr. G. Harker on the union of ethylene and hydrogen. In conclusion Dr. Chapman described the work of Dr. W. H. Love on the mitotic activity of tissue culture and of growing tumours.

Cancer Research in Great Britain and France.

DR. W. H. LOVE (Sydney) gave a brief and general account of the research activities of various institutions in Great Britain and France. These included the Strangeways Research Laboratory, Cambridge; the Free Cancer Hospital, Fulham Road, London; the Middlesex Hospital; the Imperial Cancer Research Fund, London; St. Bartholomew's Hospital; the Westminster Hospital; the Radium Institute, London; the Radium Institute of the University of Paris; and other centres where work which was chiefly clinical was being carried out. He illustrated his remarks by a series of lantern slides.

Cancer and Tuberculosis.

DR. THOMAS CHERRY (Melbourne) described further results obtained by the injection of tubercle bacilli into mice. He confined his remarks to ulcers and tumours of the pylorus. He illustrated his remarks by numerous lantern slides and demonstrated tumours in several mice.

Medical Certification of Deaths from Cancer: Pathological Classification of Cancer.

At the second conference the question of the certification of deaths was discussed and it was resolved (Resolution No. 4) that death certificates should in cases of deaths from cancer contain provision for stating where possible the pathological classification of the malignant disease from which the patient had died.

It was pointed out that it was not enough, however, merely to recommend or resolve that the pathological classification of the malignant disease from which the patient had died should be included in the death certificate. It was necessary to give some indication of a classification to the general practitioners who were the certifying medical officers. This pathological classification of cancer presented many difficulties and Professor D. A. Welsh was invited to contribute a paper to open a discussion on this subject. The paper was read by Dr. M. J. Holmes.

Professor Welsh's paper dealt with the necessity for a regional classification of cancers and other new growths for the purposes of the certification of the cause of death. He pointed out that for purposes of certification of death accuracy of diagnosis was the essential requirement. Uniformity of nomenclature was also highly desirable in order that a given cause of death might be recorded under the same heading and not under several different headings, as might happen if different names were given to the same cause. Two diagnostic methods were open for medical practitioners in charge of a patient suffering from tumour growth: clinical methods with and without microscopical examination. What might be an accurate and correct statement of facts if based on a microscopical examination might not be justified by a purely clinical examination. It was imperative that a microscopical examination should be made of every new growth where facilities for such an examination were provided and when the welfare of the patient would not be jeopardized by the biopsy. They had to recognize that a microscopical examination could often not be made and that they had to rely on purely clinical methods. In such circumstances accuracy was possible only when the diagnosis was tempered by restraint. It was necessary for the medical practitioner to resist the temptation to say more than the known facts entitled him to say. The principles that guided the provisional clinical diagnosis at an early stage were quite different from those that governed the ultimate diagnosis of the cause of death. The early diagnosis was based on the exclusion of what was merely possible and the selection of what was regarded as more probable. The ultimate diagnosis was based on a knowledge of all the possible causes of the death in question; and the more nearly exact that knowledge was the more carefully guarded would the ultimate diagnosis be. On a purely clinical basis, therefore, the diagnosis of the cause of death should be kept so generalized as to include all the possibilities that had not certainly been excluded. Only when the growth was submitted to a microscopical examination could the cause of death be particularized.

In order to draw attention to the necessity for a regional classification of new growths, Professor Welsh referred to the neoplastic possibilities of tumours of bone and illustrated the diagnostic pitfalls by a hypothetical case of sarcoma. Professor Welsh discussed this at some length and referred to the classification adopted by the American Registry which included all tumours. He discussed the several headings of this classification and then turned to the consideration of cerebral tumours. He pointed out that it was impossible by a purely clinical examination to make an exact diagnosis of a cerebral tumour and that preoperative diagnostic biopsy could not be carried out. Even when localization of the tumour had been successful and a surgical exploration had been done, the diagnosis would remain uncertain unless some obvious material like pus or a hydatid cyst had been revealed. Otherwise without a microscopical examination the diagnosis must remain open to all the possibilities included in the general classification of cerebral tumours. Professor Welsh then drew up a provisional classification of tumours and referred to the classification of tumours of the glioma group of Bailey and Cushing. He concluded by stating that for the certification of death a medical practitioner might find that "cerebral tumour" was the only admissible diagnosis consistent with accuracy when a patient had been allowed to die with all the signs and symptoms of an intracranial mass and without the "tumour" having been properly examined. In such circumstances he could not even be certain that the tumour was a pure new growth, for clinical evidence alone was not conclusive of new growth though it might be strongly presumptuous. In particular he had no right to refer to glioma while new growths of endothelium and of mesoblastic connective tissue were not excluded.

In order to draw attention to the different classifications in use a schedule was circulated amongst the members, in which the four classifications following were shown:

Commonwealth Classification.	*New South Wales Classification.*
Cancer	Carcinoma
Carcinoma	Cancer
Epithelioma	Carcinoma
Malignant disease	Epithelioma
Malignant tumour	Adeno-carcinoma.
Rodent ulcer	Scirrhus
Sarcoma	Rodent ulcer
Neoplasm	Sarcoma
Hypernephroma	Sarcoma
Scirrhus	Lympho-sarcoma
	Endothelioma
	Melanoma
	Melanotic sarcoma
	Embryonic tumours
	Hypernephroma
	Malignant disease
	(Type not specified)

New Commonwealth Classification.	*International Nomenclature of Cause of Death as amended, 1929.*
Carcinoma	
Carcinoma simplex	The International classification includes under the term "cancer" all forms of malignant neoplasm, notably the following:
Epithelioma	
Adeno-carcinoma	
Scirrhus	
Rodent ulcer	
Colloid carcinoma	
Paget's disease	
X ray carcinoma	
Sarcoma	Sarcoma
Sarcoma	Cysto-sarcoma
Myeloid sarcoma	Encephaloid sarcoma
Myeloma	Endothelioma
Endothelioma	Epithelioma
Melanoma	Malignant neoplasm
Melanotic sarcoma	Sarcoma
Melano-carcinoma	Scirrhus
Embryonic tumours	Cancerous tumour
Hypernephroma	Colloid tumour
Teratoma	Encephaloid tumour
Chorio-epithelioma	Heteromorphous tumour
Malignant disease (Type not specified or not included in above)	Malignant tumour Neoplastic tumour Cancerous ulcer

Dr. Holmes pointed out that in the period 1908 to 1923 of 63,148 deaths from cancer in Australia: 26·65% were certified as due to "cancer" without further qualification, 11·74% were certified merely as due to malignant disease, 1·50% as due to malignant tumour and 0·47% as due to neoplasm.

A total of 40% was certified so indefinitely that it was not even known whether the death was from such widely different conditions as carcinoma or sarcoma, except as indicated by the "site" and even this was not always indicated. The position was better today but was still bad.

Dr. Holmes drew attention to the fact that in 1928 a combined meeting of the Federal Health Council and Commonwealth and State statisticians was held with a view, among other things, to improving the unsatisfactory situation regarding the certification of deaths. Certain resolutions were passed at this meeting involving the matter of referring certificates containing indefinite or misleading terms back to the certifying medical officers and recommending the preparation of a draft leaflet to be inserted in every book of blank medical certificates of death conveying information to the medical practitioner on points to be observed in connexion with the certification of death. The meeting also recommended that as regards mortality tables for publication by statisticians, deaths from cancer should be grouped to show distribution according to sex, age, anatomical site, pathological type of disease and occupation. For females conjugal condition and issue should be shown.

These recommendations had resulted in a very much improved situation as regards the certification of deaths. The Director-General of the Commonwealth Department of Health and the Commonwealth statisticians had prepared a draft leaflet of information to certifying medical officers. This leaflet was inserted in all books of blank medical certificates of death issued by the Commonwealth. South Australia and New South Wales had issued similar information to certifying medical officers and death certification were now much more accurately carried out.

But what was necessary and had not yet been provided was a uniform pathological classification for the use of certifying medical officers in the certification of deaths from cancer. This was essential to the proper investigation of cancer. The statisticians would welcome it. Last year the Commonwealth statistician asked the Commonwealth Department of Health for a suitable pathological classification and the new Commonwealth classification indicated on the schedule (*vide supra*) was adopted.

Dr. Holmes pointed out that when deaths were certified as due to "malignant disease" the case was referred back to the medical practitioner for further information. This was a decided improvement. Still the new Commonwealth classification was not "the last word". A better pathological classification was possible. Professor Welsh had indicated his opinions in favour of a separate classification for each organ or tissue involved. Should an amended classification be decided upon subsequent action presented no difficulties.

DR. L. M. MCKILLOP spoke of the advisability of having a separate notification form for use in deaths from cancer.

DR. F. P. SANDES was in agreement with Dr. McKillop.

DR. J. H. L. CUMPSTON said that statistical records might become so voluminous that no one would use them. He suggested that a committee might be appointed to consider the matter.

DR. F. S. HONE said that they were losing sight of the desiderata. What was wanted was a correct certification of the cause of death. The general practitioner was not in the habit of making a biopsy. Clinics and similar bodies might draw up and use a more elaborate classification. He referred to the need for emphasis in lectures on preventive medicine to medical students on the certification of the cause of death and raised the point as to how far routine biopsy was justified in cancer.

DR. THOMAS CHERRY agreed that the more intricate statistics were, the more worthless they would be. For practical purposes malignant disease might be classified under four headings: epithelial, connective tissue, lymphoid and embryonic tumours. If this classification were used and the site of metastases were stated, little more would be necessary.

DR. H. G. CHAPMAN supported Dr. Hone. He said that study of statistics was a method of examining facts. That mathematics did reveal facts was brought home to him in connexion with the work among miners at Broken Hill and workers in sandstone. The information available depended on the accuracy of observations and in certification of death the reliability of the data was open to question. He agreed with the suggestion of Dr. Hone that clinics might collect information which could be handled statistically.

DR. A. T. NISBET pointed out that sometimes no biopsy should be made, for example, in a tumour of bone in a child. There were other means of diagnosis such as a diagnostic dose of X radiation.

It was resolved:

> That a committee consisting of Dr. Holmes, Professor Sandes and Professor Welsh, study the whole question of the pathological and statistical classification of cancer and that this committee be instructed to regard as of primary importance the provision and distribution of reliable and practical advice to all persons in medical practice as to classification and site with special respect to certification.

Notification of Cancer.

The question of the desirability or otherwise of making cancer a notifiable disease was discussed at the second Cancer Conference, but there was some divergence of opinion amongst members and the Conference did not feel itself in a position to express a definite opinion. It was decided that steps should be taken to ascertain from the members of the profession throughout the States whether or not the time had arrived to make cancer a notifiable disease. The second Conference had refrained from expressing any opinion on this question.

The Conference requested that the Commonwealth Department of Health should make the necessary inquiries, and communications were sent accordingly to the several Branches of the British Medical Association asking for the views of the members of each Branch on the matter of the notification of cancer.

The Secretary of the Federal Committee of the British Medical Association was informed of the action taken in approaching the State Branches.

It was pointed out that replies had been received from five of the Branches. The Queensland, New South Wales, Victorian and South Australian Branches were not in favour of notification. The Western Australian

Branch thought that it was desirable to make cancer a notifiable disease by means of some form of confidential report. No reply was received from the Tasmanian Branch.

Diploma in Medical Radiology and Electrotherapeutics.

At the second Australian Cancer Conference the matter of post-graduate instruction in radiology was discussed and the following resolution was passed:

> This Conference commends to the Commonwealth Department of Health the suggestion that the possibility of the introduction of a Diploma of Medical Radiology and Therapeutics be discussed with the universities having medical schools through the faculties of medicine, and in doing so the Conference urges that the Department of Physics be intimately associated with the introduction of this Diploma.

Following upon this resolution the matter was taken up by the Commonwealth Department of Health with the universities of Sydney and Melbourne.

The Commonwealth Department of Health wrote for, and obtained from Great Britain full particulars regarding the bodies in Great Britain which confer a Diploma in Medical Radiology and Electrotherapeutics and the requirements of those bodies in respect of preliminary qualifications, length of diploma course, the course of study laid down in physics, clinical radiology and electrology, and the examinations to be passed. Particulars regarding the syllabus and practical work were also obtained. Of particular value was a statement received from Professor Woodburn Morison, Director of the Radiological Department at the Cancer Hospital, London, who was actively associated with the institution of the Edinburgh Diploma and course. In this statement Professor Woodburn Morison set out his recommendations and draft schedule for the proposed course at the University of London.

This information obtained from Great Britain was forwarded by the Commonwealth Department of Health to the Universities of Sydney and Melbourne for their information and guidance.

At the University of Sydney the Faculty of Medicine appointed a committee consisting of Professors J. C. Windeyer, Professor D. A. Welsh, Professor O. U. von Willer, Professor Harvey Sutton, Professor H. R. Dew and Dr. E. H. Molesworth to consider and report upon the matter of the provision of a diploma course at that University. Dr. F. P. Sandes, Director of Cancer Treatment, University of Sydney, approached this committee in connexion with post-graduate instruction in radiology, and in September, 1931, Dr. M. J. Holmes of the Commonwealth Department of Health was invited to attend a meeting of the committee and to place the views of the Cancer Conference before it. At this meeting Dr. Sandes also was present and the matter was discussed from all aspects. The committee subsequently reported to the Faculty of Medicine and recommended the institution of a diploma in radiology at the University of Sydney. The Faculty made a recommendation to the Senate. The Senate adopted the recommendation and referred the matter back to the Faculty for the drawing up of a syllabus.

At the University of Melbourne the Faculty of Medicine appointed a committee consisting of Professor Laby, convenor; Professor Osborne, Dean of the Faculty; Dr. B. Kilvington and Dr. L. S. Latham to consider and report upon the matter of the institution of a diploma at the University of Melbourne. Dr. M. J. Holmes interviewed the several members of this committee and placed the views of the Cancer Conference before them. The Faculty passed a general resolution in favour of a diploma, but the committee has not yet been called together and so far little actual progress has been made.

Reference was made to the importance of providing in Australia for the adequate training of men in order to fit them to use to the fullest advantage the weapons available for the treatment of cancer. Emphasis was also laid on the harm that arose from inexpert use of these weapons. The necessity for a thorough grounding in physics was advised.

Educational Campaign in Relation to Cancer Control.

The place of publicity in connexion with the organization for the control of cancer in Australia was discussed at the second Cancer Conference. The question of a coordinated educational campaign throughout Australia was considered and various suggestions were made as to the adoption of new methods of publicity and as to the extension of the scope of propaganda.

The Conference felt that a larger amount of information and experience was desirable before any definite decision was come to as to the launching of a general educational campaign. It was thought that the various methods of publicity referred to by delegates from the several States should be tried by the different State organizations in order that at the next Annual Conference sufficient experience should have been accumulated to enable an intelligent discussion to take place in the light of the knowledge gained.

The second Conference, therefore, passed a resolution recommending that those in control of cancer treatment in the different States be asked to investigate the possibility of a general educational campaign throughout the Commonwealth.

Following upon this resolution the Commonwealth Department of Health wrote to the cancer organizations in the several States drawing attention to this resolution and suggesting that such steps should be taken as in each State appeared to be suitable for the better dissemination to the public of information regarding the occurrence of cancer and the necessity for early treatment, or that any other method might be adopted to secure what is recognized to be an immediately desirable step in progress, namely, the early treatment of cancer throughout the community.

Dr. Holmes said that Victoria, Western Australia and Tasmania reported that no action had been taken in the matter. In South Australia the General Committee of the Anti-Cancer Campaign reported that the matter of a general educational campaign against cancer had been considered by the local committee, but that it had been felt that for the present the matter could best be dealt with by individual members in addresses, press statements *et cetera*, as opportunity presented itself.

In New South Wales a pamphlet had been issued by the Cancer Research Department of the University of Sydney. Wireless talks had been given, slides had been shown in theatres and posters of various kinds had been used.

DR. J. G. STEPHENS suggested that any articles issued to the public should bear the signatures of those controlling the official organizations.

DR. F. P. SANDES pointed out that people in Sydney were already being turned away from hospitals for lack of beds.

DR. H. G. CHAPMAN thought that pamphlets were an excellent means of spreading knowledge. The dissemination of accurate knowledge was important. He referred to *The Journal of the Cancer Research Committee* and said that a large number of copies were sent abroad. He hoped that it might be possible to make that journal permanent.

It was resolved:

> That the Commonwealth Department of Health be asked to inaugurate a coordinated educational campaign throughout Australia.

The Influence of Contraceptives on the Causation of Uterine Cancer.

Dr. Holmes introduced the subject of the influence of contraceptives on the causation of uterine cancer. He said that the matter was discussed at the second Cancer Conference and that the Conference recommended to each State organization the desirability of studying the effects of contraceptive agents in relation to the causation of uterine cancer, and of preparing reports for consideration at the next Conference.

Although it was left to the organization concerned with cancer control in each State to initiate such investigation as appeared practicable, it was thought that in the prepara-

tion of reports it would be necessary, if the discussion was to be of value, that the information should be collected on comparable lines. So large a number of possible factors required consideration in each case of utero-vaginal cancer before any conclusion could be drawn as to the probable influence of the use of contraceptives, that a wide range of inquiry must be covered and each case investigated from this point of view. Unless this were done, it would not seem that the investigation would be worth the time and energy given to it.

Cancer of the cervix was known to be relatively uncommon in non-parous women. Even if women had not had children there were such factors as abortion, venereal disease, infection and various morbid conditions of the mucosa to be eliminated, all presumably more likely to have an influence on the causation of cancer than the use of a contraceptive.

Although cancer of the body of the uterus was relatively more common in single women as compared with married women than cancer of the cervix, still the great majority of cases of cancer of the *corpus uteri* occurred in married women who had borne children or who on account probably of some morbid condition of the uterine mucosa were sterile. In those single women who developed cancer of the *corpus uteri*, the influence of infection, abortion and of venereal disease *et cetera*, required to be carefully considered as well as that of the possible influence of contraceptives.

There was reason to believe that contraceptives were now much more freely used than previously, yet statistics appeared to show that in Australia at least mortality from uterine cancer was increasing much less rapidly than that of cancer of the breast, for example.

These were merely some indications of the difficulties associated with an investigation into the influence of contraceptive agents in the causation of uterine cancer, but they were enough to indicate that any investigation must provide for a very wide range of inquiry into each case, and that information must be tabulated on more or less comparable lines.

Dr. Holmes went on to say that the Commonwealth Department had accordingly drawn up a schedule covering the principal headings under which it was suggested that special information might be tabulated. This schedule was forwarded to the Directors of Cancer Treatment in Sydney and Adelaide and to leading gynæcologists in Melbourne and Brisbane for their consideration and comments. Dr. Holmes had copies of this schedule placed before delegates. He said that replies had been received from Dr. F. S. Hone, Adelaide; Dr. R. Fowler, Melbourne; and Dr. L. M. McKillop, Brisbane.

Dr. Fowler, Melbourne, considered that the gathering of reliable evidence would be most difficult in view of the complicated nature of the investigation. Even if the investigation were carried out in connexion with the patients suffering from utero-vaginal cancer, a control investigation would be necessary in respect of the use of contraceptives by persons who were not suffering from cancer. He considered that the postulate that contraceptive agents were ætiologically connected with uterine cancer was not supported by statistical evidence.

Dr. McKillop, Brisbane, had stated that consideration of the possible influence of contraceptives in the causation of uterine cancer opened up a very wide and controversial question. He had submitted the proposed schedule of investigation to gynæcologists in Brisbane but was unable to elicit any conclusions. Dr. Holmes then indicated Dr. McKillop's attitude towards the investigation. Dr. McKillop considered that contraceptives were not employed as much as one might imagine. When employed they consisted of (*a*) quinine and cocoa butter suppositories; (*b*) whirling sprays and vaginal douches, containing a more or less strong disinfectant such as lysol or permanganate of potash, in solution or even salt and water; (*c*) condoms covering the external os of the uterus.

He stated that in so far as his experience went, cancer arising in an intact cervix was very rare, and for this reason consideration need be given only to cases of the disease which had arisen in lacerations or other pathological conditions of the cervix. If, following birth injury, a cervical laceration was left untreated, a very definite premalignant condition was set up and it was in exactly this type of case that contraceptives might play some part in inducing cancer growth. Exact figures which had a bearing upon this relationship were obviously very difficult to obtain, but questioning of women suffering from cervical cancer, regarding the use of contraceptives, had not convinced him that there was any association beyond coincidence. He regarded the persistent chronic cervical infection so frequently, in fact almost invariably, associated with a cervical laceration in women in the child-bearing age, as of far more consequence as an ætiological factor than the use of contraceptives. In point of fact where the contraceptive measure involved vaginal douching with a non- (or very slightly) irritating solution, he considered the consequent cleanliness would be against and not in favour of the development of a neoplasm. Moreover, it was exceedingly difficult to get some women, especially single women, or those living apart from their husbands, to admit the use of contraceptives. With regard to cancer of the body of the uterus, Dr. McKillop was of opinion that this was practically always a sequel of the mucosal changes induced by intramural or submucosal fibroids, or by *fibrosis uteri*. Here contraceptives of the mechanical type could obviously be the only ones which could have any influence in inducing cancer. As, however, these women were usually sterile, contraceptives were not used by them. In three cases of corporeal cancer the only contraceptives used were douching with strong saline solution in one case and with "Sanitas" or lysol in the other two.

Dr. McKillop reported that the *questionnaire* submitted by the Commonwealth Department of Health was as complete as he could make it and suggested that consideration of this question be deferred until an investigation could be conducted by the Branches of the British Medical Association, along set and definite lines, as had recently been done by the Queensland Branch in regard to maternal morbidity and mortality in obstetrics. He pointed out that if a full year were allowed for this, a report could be submitted to the 1933 Cancer Conference which would be more accurate and statistically correct than could be attempted for the present Conference.

Dr. Holmes said that Dr. Hone, Director of Cancer Treatment and Research of the Anti-Cancer Campaign of South Australia, advised that the matter had been considered fully at the meeting of the consultative clinic at the Adelaide Hospital and that it was thought, in view of the extent of the inquiries necessary, that it was useless to attempt the investigation.

No reply was received from the Director of Cancer Treatment at the University of Sydney.

In the discussion which followed the statement by Dr. Holmes, Dr. F. P. Sandes expressed the opinion that the inquiry would lead nowhere.

DR. W. CUSCADEN thought the inquiry would be a waste of time.

DR. CONSTANCE D'ARCY thought that some action should be taken in regard to the use of metal (gold spring) pessaries.

DR. J. G. STEPHENS suggested that the question might be submitted to experimental investigation.

No further action was taken.

Protection Measures in Connexion with the Use of Radium and X Rays.

At the second Cancer Conference the question of the protection of workers and patients from damage arising from unnecessary exposure to radium and X rays was fully considered. A special committee was appointed by the Conference to deal with this matter. This committee made a report to the Conference which included a number of recommendations which were adopted as resolutions of the Conference.

In these resolutions it was stated that it was desirable that those who used X ray diagnostic and therapy equipment should be able to have their equipment inspected as was done in Great Britain by the National Physics

Laboratory. Such an inspection, it was suggested, would need to be carried out by the Commonwealth Department of Health or some other body which would organize the inspection service and would bear so much of the cost as was not defrayed by the user of the equipment.

The second Conference also passed a resolution directing the attention of the authorities at all hospitals using radium to the necessity for providing adequate protection both for patients and staff, and for insuring that adequate precautions were actually taken against the dangers associated with exposure to radium. The Conference recommended that at each hospital using radium action be taken to determine the practical adequacy of the protective measures in use at the hospital.

Dr. Holmes reported that the following action has been taken in respect of these resolutions.

The attention of all treatment centres had been drawn to the resolutions of the Conference in a circular letter in which it was asked that close attention be paid to the recommendations of the Conference and especially to the matter of strict conformity with the International Recommendations. Replies were received from the various treatment centres stating that close attention would be given to the matter. Very considerable progress had been made during the year in the provision of adequate facilities for the protection of personnel and in the supervision of personnel from the point of view of detecting any evidence of undue exposure.

Arrangements had been made at the Commonwealth Radium Laboratory, Melbourne, to carry out the measurement of the exposure to which individual workers were subjected in their daily work.

Standard photographic films had been exposed in suitable containers at various points in the rooms in which work was carried out, and films had similarly been exposed on the persons of the workers themselves both at the Commonwealth Radium Laboratories and at certain hospitals. These films were developed under standardized conditions and the density was measured. An index to the degree of exposure was thus provided.

In connexion with this piece of work, some films had recently been sent to the Brisbane and South Coast Hospitals Board with full instructions covering exposure, development and measurement of density.

As was requested by the last Conference, evidence had been collected on the question of the tolerance dose. This evidence, together with a statement regarding the progress of the research in connexion with the measurement of exposure, would be made available to the Conference in a paper by Mr. Turner.

In Melbourne a conference was convened by Professor Laby and Dr. W. G. Cuscaden to discuss matters involved in the use of radium and X rays. At this conference the principal hospitals were represented. As regards measurement of exposure, the conference had recommended that the photographic method in use at the Commonwealth Radium Laboratory should be adopted and that the hospitals should cooperate with the Commonwealth Radium Laboratory in this investigation.

As regards blood examination tests, it was pointed out that the carrying out of blood examinations at monthly intervals caused considerable inconvenience. It had been agreed that the performance of blood examinations at monthly intervals should be aimed at, but that the maximum tolerance test examinations should not exceed three months.

The basal metabolism test had not been carried out, except on the staff at the Commonwealth Radium Laboratory where a three-monthly test was made, the results of which were carefully recorded.

In regard to warning notices, Dr. Holmes said that a subcommittee was appointed by the Conference of Hospitals in Melbourne to draw up suitable notices describing the precautionary measures to be taken in X ray and radium departments and to arrange for the printing. Dr. Kaye Scott would later inform the delegates in more detail regarding this. Dr. Holmes also said that the Queensland Cancer Trust had forwarded a copy of a warning notice prepared by it for use in departments where radium was employed.

Referring to inspection of X ray equipment, Dr. Holmes pointed out that as a preliminary the Commonwealth Department of Health had prepared lists of all X ray equipment in use in Australia for therapy or diagnostic purposes with a view to envisaging the extent of inspectional work that would be required. The lists were very extensive.

The Conference of Hospitals in Melbourne had agreed on the desirability of having X ray installations inspected, and also agreed that if a hospital desired to have its X ray installation inspected the Commonwealth Department of Health and the Natural Philosophy Department of the University of Melbourne should be invited to make the inspection. Details had not yet been finalized and the matter was still under investigation. No decision had been reached as to whether an inspection should include the performance of the equipment from a physical point of view as well as the electrical and radiation safety. No hospitals had so far applied for an inspection.

No information had been received from other States regarding action taken in respect of the resolutions of the last Conference regarding protection of workers.

Dr. Holmes reminded delegates that at the Third International Congress on Radiology which was held in Paris in July, 1931, the recommendations of the Second International Congress for the protection of radium and X ray workers were reconsidered. No very material modification had been made. The revised International Recommendations had been published in *The British Medical Journal* of October 31, 1931, and the Commonwealth Department of Health had circularized all treatment centres on December 9, 1931, drawing attention to the alterations and additional recommendations made at the International Congress. Consequently it was not necessary to recapitulate them. Professor Woodburn Morison indicated that the Third International Congress left the matter in rather an indefinite position since recent developments in self-protected apparatus had altered the whole aspect.

The British Institute of Radiology had criticized the recommendations of the International Congress and the latest advice just received was that the Protection Committee was now considering the whole matter.

Photographic Method of Protection Measurement.

MR. A. H. TURNER, of the Commonwealth Radium Laboratory, read a paper on the photographic method of protection measurement. He said that when installing protection for X ray and radium laboratories it was usual to carry out the recommendations drawn up by such bodies as the International Congress of Radiology and the Bureau of Standards. The adoption of such protective measures should render the working conditions comparatively safe, but it was desirable in any given case to make certain of the adequacy of the measures taken by direct measurement of the intensity of the stray radiation to which the workers were exposed. It was also desirable to discover whether the individual workers were taking full advantage of the protection installed, for the personal factor was of considerable importance, and carelessness might render otherwise suitable protection inadequate.

In order that such measurements might be carried out two things were necessary: (*a*) A means of measuring precisely the small intensities of radiation involved; and (*b*) a standard or tolerance intensity, namely, a value of the intensity to which a worker might be continuously exposed without injurious result.

To measure the radiation intensity a sensitive electroscope or similar instrument might be used, but a much more satisfactory method was one depending on the photographic effect of the radiations. By the photographic method not only might the intensity in various places in the laboratory be discovered but the actual dose received by each individual might be measured. In addition the dose received by various portions of the worker, such as the hands, might be measured. Other advantages possessed by the photographic method were that no elaborate or expensive apparatus was required and the records obtained were permanent.

Since 1925 a number of suggestions had been made in the literature regarding the tolerance intensity for X rays.

These suggestions had been based on the considerable experience in the therapeutic use of X rays by the various writers, and on cases in which approximately known doses had been received over a long period without apparent injurious effects. These estimates of the tolerance intensity varied from 4×10^{-3} *r*/minutes to 2×10^{-4} *r*/minutes, but a consideration of the various figures led to a value of 4×10^{-4} *r*/minutes, which might, with considerable confidence, be looked upon as an intensity to which an individual might be continuously exposed with negligible biological results. A worker exposed to such an intensity for one working day (eight hours) would receive a dose of about 0·2 *r*, and in one year of 300 working days a dose of approximately 60 *r*; so that it would require approximately ten years for an erythema dose to be received. In the case of γ rays, where the erythema dose might be looked upon as 3,000 *r*, over thirty years would be required.

The photographic method of measuring X ray and γ ray intensities depended for its success upon the two following conditions: (*a*) The blackening produced in the emulsion was related to the dose of radiation which it received; and (*b*) for X rays and γ rays the photographic effect was additive. Both of these conditions had been confirmed by considerable experimetal evidence.

If a number of films were exposed to various doses of X rays or γ rays and the blackening measured by some form of photometer a curve might be plotted showing the relationship between dose and blackening produced for the particular type of film used. The blackening was taken as the ratio of the light transmitted through the clear unexposed portion of the film to that transmitted through the exposed portion. The logarithm of this ratio was termed the photographic density of the film and it was more usual to speak of the photographic density than of the blackening of a film. If the photographic density was plotted against the dose a curve known as the Hurter-Driffield curve was obtained. The shape and position of this curve depends on the following factors: (*a*) The brand of film used; (*b*) the composition of the developer; (*c*) the time of development; and (*d*) the temperature of the developer.

Both the two last mentioned were very important factors—the time of development and temperature of developer; an error of 2° C. in temperature might upset the film density by 20% and an error of one minute in a development time of four minutes might cause a similar density error. It was essential therefore that in work of this kind the development technique should be carefully standardized.

The Hurter-Driffield curve having been obtained for any particular brand of film, it was therefore possible to expose a film, photometer it and deduce its density and then from the curve to deduce the dose of radiation which it had received. The initial calibration of the film (obtaining the H.D. curve) required the use of a photometer which was an expensive instrument; but it was possible, subsequently, to compare exposed films with standard films of known density and dose by eye to an accuracy of 0·1 in density, and such comparison would be sufficiently accurate in the protection measurements in hospitals and other institutions. Hospitals could therefore be supplied with such a set of standard films from a physical laboratory, and by adhering to the same brand of film and developmental technique, could perform their own protection measurements.

In the calibration of film for X ray protection measurements a dosage meter reading in *r* must be employed. For γ rays a radium source might be used and the dose in *r* received by the film deduced from suitable tables showing the dose in *r*/minutes at various distances from a radium source.

The practice at the Commonwealth Radium Laboratories was as follows: (*a*) The film used was "Agfa" X ray film—this film had been found very suitable for photometric work by the Physics Department on account of its uniformity and fine grain; (*b*) the film was calibrated with a radium source; (*c*) the film was developed for four minutes at 18° C. with standard "Agfa" developer; (*d*) the developed film was photometered with a Moll microphotometer and the density deduced.

The films were worn by the workers enclosed in small wooden holders to prevent mechanical exposure due to bending *et cetera* and to prevent body moisture from affecting them. The size of the films was about two by three centimetres and they were worn by the workers for one week. X ray dental films could be used and would probably be more convenient in hospitals, but it would be desirable in the case of this film to expose it for a longer period than one week, as it was not so fast as "Agfa" film.

When using the photographic method for X ray measurements it was necessary to discover roughly the quality of the radiation, since the photographic effect depended on wave length. This might be done by covering one portion of the film with a strip of copper 0·1 millimetre thick and another portion with a strip of aluminium one millimetre thick. For radiation of greater wave length than about one Ångström unit the aluminium was relatively the more transparent and for shorter wave lengths the copper was relatively more transparent. Such a rough estimate of the quality was sufficient for most protection measurements and was the method employed at the Philips lamp works.

Mr. Turner concluded by saying that the working conditions had been fully investigated at the Commonwealth Radium Laboratories by the photographic method and the evidence bore out the suitability of the protection indicated by the periodic blood examinations. Such direct measurement was of more value than blood tests in that it showed whether any damage was likely before actual damage had occurred.

Warning Notices.

Dealing with the question of warning notices, Dr. Kaye Scott (Melbourne) said that a committee appointed by a meeting presided over by Professor Laby had met early in 1932 to draw up notices indicating protection measures to be taken by persons working in X ray or radium departments. It was decided to include a short statement of the dangers and treatment of electric shock, as casualty surgeons and others were in the habit of using X ray machines for screening purposes.

The notice consisted of two parts. In Part I there was a statement of the dangers and immediate treatment of electric shock, the necessity for the prompt removal of the patient from contact and the institution of artificial respiration if apnœa were present.

Part II of the notice had to do with precautions to be adopted by radium workers and was drawn up specially for the information of members of the nursing staff and of technicians. It was felt that the members of the medical staff should be familiar with the more amplified details of the international regulations on the subject. The risks run by radium workers were stated and they were warned of the need for the constant use of the protective apparatus supplied in the departments. Directions as to preparation, sterilization, cleaning and storage of radium under these conditions were stated. Workers were advised to submit to any tests indicated by the authorities to determine any detrimental effect of radiation.

The X Ray Department at Saint Vincent's Hospital, Melbourne.

Mr. A. H. Turner gave an account of the new X ray block which is being constructed at Saint Vincent's Hospital, Melbourne. The protection sought was such as would be adequate for a deep therapy plant operated at 400 kilovolt peak. The plant to be installed was a "Solus" equipment which would furnish a pulsating potential of 300 kilovolt peak. It was thought desirable to provide protection for the higher kilovoltage to allow for future development. The International Protection Committee had recommended that for voltages of 400 kilovolts peak the protection provided should be 1·5 centimetres of lead or its equivalent. With such a potential the minimum wave length approached that of the softer γ rays of radium. It had been decided that for the walls of the therapy department bricks made of barium cement should be used.

The bricks were made, tongued and grooved in such a way as to leave no leakage of radiation at the joints. The bricks were made of two parts of coarse barium sulphate, one part of barium flour and one part of Portland cement. The bricks had been tested to determine their lead equivalent with γ rays of radium. It had been found that a thickness of ten centimetres of brick was equivalent to approximately 1·9 centimetres of lead and that a brick of this thicknesss would afford sufficient protection. For the ceiling of the therapy room sheet lead 1·5 centimetres thick would be used. This lead would be placed over a reinforced ceiling and would overlap the barium brick walls. The sliding doors of the room were to be protected with 1·5 centimetres of lead.

DR. H. G. CHAPMAN said that there was no difficulty in procuring protection against radiations. He referred to the recommendations of the International Conference on Radium and said that for ventilation in the presence of radiations it was necessary to change the air ten times per hour. He said that an investigation was not favoured at the Royal Prince Alfred Hospital. They did not want to know the condition of affairs. Noxious gases were produced in appreciable amounts in a few minutes. Artificial ventilation should be provided in all departments were radiations were used.

MR. T. WILKINS agreed with the need for ventilation and referred to the fumes generated at the Royal Prince Alfred Hospital.

The question was discussed shortly by Dr. Eddy, Dr. J. G. Stephens, who suggested the use of fans on the floor, Dr. L. M. McKillop and Dr. F. P. Sandes.

Dr. H. A. McCOY referred to need for changing from time to time the personnel of the staff in radiation departments in hospitals and said that those in charge did not realize the need for change.

It was resolved:

> That this Conference requests the Commonwealth Department of Health, in accordance with the recommendations of the International Congress on Radiology of 1931, to draw the attention of the governing bodies of hospitals which possess modern clinics to the importance of regular exchange at quarterly intervals of the nursing staff whose duties are connected with the clinic.

Measurement of X Ray Dosage.

The wide variation in the results obtained with X ray therapy and the difficulties associated with the reproduction of succcessful techniques were discussed at the second Cancer Conference. The inadequacy of the provision made to measure quality of radiation and the dosage actually received by the patient were considered to be primary causes of the unsatisfactory position. It was resolved at the second Conference that:

> This Conference strongly recommends to all institutions and practitioners concerned that in all X ray treatments an ionometer be used to measure the dose actually delivered, and that all doses be regarded in ionometric units with adequate description of the quality of the radiation used, and that all steps be taken in each State to secure the calibration of such measuring instruments.

Dr. Holmes pointed out that during the year much attention had been given to this matter by the treatment centres carrying out X ray therapy throughout Australia, and in several large hospitals dosage meters had been installed measuring in the Röntgen unit. So far arrangements had not been made for the calibration of these instruments.

In Melbourne a conference of hospital representatives had been convened by Professor Laby and Dr. Cuscaden to consider the whole matter. It had been agreed at this conference that it was desirable to introduce an ionization method of measuring X ray doses and that the international Röntgen unit should be adopted. There was variance of opinion on the necessity or otherwise of making ionization measurements during each treatment, and as to the value of the simpler and cheaper measuring instruments.

The cost of dosage meters in addition to the high costs of purchase, maintenance and running of X ray apparatus had largely interfered with progress in the present financial stringency. The absence of provision in the Commonwealth for the proper calibration of dosage meters presented another difficulty. In the other States also the matter had been receiving unremitting attention. It was important that as close coordination as possible should be reached in methods of technique, and that uniform methods of determining the quality of radiation and of measuring dosage should be adopted.

In order to clear the way for definite action, provision had been made at this (the third) Conference for a full discussion of the problems and difficulties.

The Output of Various Types of X Ray Apparatus.

DR. EDDY, of the University of Melbourne Physics Department, read a paper on the output of various types of X ray apparatus and on the influence of wave form on X ray production.

X Ray Apparatus and X Ray Tubes.

MR. T. WILKINS (Sydney) read a paper in which he described X ray apparatus and X ray tubes which he had used in his work for the Cancer Research Committee of the University of Sydney. The X ray apparatus described were those of Saint Vincent's Hospital, Sydney; of the Royal Prince Alfred Hospital; the Gaiffe Gallot machine at the Department of Physics, the University of Sydney; a Victor Snook plant, a Kelly Koett plant and a Gaiffe Gallot and Pilon C.P. machine. He described the advantages of each machine and referred to mishaps which had occurred during the use of several of them.

The Seeman Spectrograph.

DR. J. G. STEPHENS (Sydney) read a short paper on the estimation of X ray quality by the Seeman spectrograph.

Methods of Measuring High Voltages.

PROFESSOR KERR GRANT, of Adelaide, forwarded a paper in which he discussed some methods of measuring high voltages. He pointed out that in radiographic or therapeutic X ray installations the high tension voltage might have any value between 20 and 200 kilovolts; in most recent deep therapy outfits the kilovoltage was up to 400 and in a single instance up to 900. Direct measurement of these high voltages was desirable since both the quantity and the quality of the radiation depended largely upon the voltage applied to the tube. Professor Grant enumerated and briefly discussed the methods and instruments constructed for the making of these measurements.

He referred first to the voltmeter or ammeter in the primary of a high tension transformer. After describing the limitations of this method and referring to possible sources of error, he concluded that actual experience showed that the method of determining high tension voltage by a reading of primary current with a carefully determined calibration chart was, within limits, reliable, as it was certainly simple and convenient.

The second method mentioned was most commonly in use, that of the spark gap. He said that the advantages and disadvantages of this method were well known and pointed out that errors of as much as 10% or 20% resulted from measurement in which there was a departure from standard conditions of observation.

After describing the high resistance and low range voltmeter Professor Grant concluded that the method was a cheap and convenient way of breaking down high voltages to an easily measurable value in the laboratory. It seemed doubtful whether it could be made the basis of a permanent voltage measuring unit. Its field of utility lay rather as a means of calibrating other instruments.

In regard to static electrometers, Professor Grant said that they had the advantage over current voltmeters that they passed no current (on direct current circuits) and consumed no power. He referred first of all to the "Abraham" and to the "Starke-Schroeder" instruments. He said that both these instruments were inexpensive in

the country of their manufacture and could easily be made in any instrument workshop at a cost which need not exceed £50 for an instrument with a range of 200 kilovolts. The "Thornton" torsion electrometer was of interest on account of the simplicity of its construction. Professor Grant had had a rough model of the instrument constructed at the University of Adelaide and was of the opinion that it was well adapted for measurements up to 200 kilovolts.

In regard to the determination by means of an X ray spectrograph, Professor Grant referred to the exact relationship between the shortest wave length of the X ray produced by a tube and the maximum voltage applied to it. The relation was one of simple proportion and the voltage was attained from the wave length by dividing the value of the wave length in Ångström units into 12,400. If, therefore, an X ray spectrograph was available (and a special type was made by a German firm for this purpose) and if a spectrum of the X radiation was taken, then the spectrum was found to be terminated by a more or less sharp boundary on the short wave side and the shortest wave length emitted could be found from a simple measurement of the distance between this boundary and the position of the direct beam of radiation and the constants of the spectrograph. From this wave length the value of the peak voltage applied to the tube was found by applying their relation already mentioned. This method was valuable as a check on the accuracy of other determinations, but obviously on account of the time required for setting up the spectrograph, preparing the photograph and measuring the position of the short wave limit on the spectrum, was not a convenient one for giving daily or continuous values.

The next method discussed by Professor Grant was that of the convection voltmeter, constructed by himself and Dr. Mark Oliphant. This method depended on the same principle as the experiment known as the "electric hail". Professor Grant described the apparatus and pointed out that the power consumed was negligible.

The last type of apparatus described by Professor Grant was that known as the electrostatic generator voltmeter. This apparatus was described in the "Review of Scientific Instruments" for 1931.

The Standardization of Dosage Meters and Kilovolt Meters.

MR. A. H. TURNER (Melbourne) read a paper on the standardization of dosage meters and kilovolt meters. He pointed out that dosage meters (and by this term he included all ionization instruments such as ionometers, iontoquantimeters *et cetera*) were used at all institutions possessing up-to-date X ray equipment. Owing to their complexity and delicacy of construction these instruments were liable to injury or loss of adjustment. It was therefore important that there should be some means of calibrating them in Australia and that some centre should be established at which the calibration could be performed. He pointed out that a standard ionization chamber could be set up in a well equipped X ray physical laboratory at relatively small cost. He urged the use of kilovolt meters for therapy installations and said that kilovolt meters could be calibrated at the same institution as the dosage meters.

The Solomon Ionometer.

MR. T. WILKINS (Sydney) read a paper in which he discussed the Solomon ionometer. He said that he had hoped to report observations in which he showed the values of Solomon *R* units in terms of international *r* units of dosage. The work, however, was not complete.

Mr. Wilkins recorded observations made with the Solomon ionometer and concluded as follows:

1. The instrument is not a very accurate one, more especially under the conditions of use obtaining in practice. Natural leak is nearly always present and the amount of leak varies with humidity, dust *et cetera* in the atmosphere. X rays, other than those directed on to the ionization chamber, often fall on the leads and cause the instrument to discharge more quickly than it otherwise would discharge.

2. It is, however, a convenient instrument and one which is easy to use. Provided due care is taken to check leak and cover leads with lead rubber, it is sufficiently accurate for ordinary use in deep X ray therapy. It is comparatively cheap and is an excellent safeguard against the possibility of omitting safeguards.

3. This instrument, in common with all other X ray dosage meters, should be calibrated against a standard meter when first installed and at intervals thereafter.

4. Although they are of little use when comparing the results from one deep therapy machine with those from another, the use of milliampère minutes as a measure of dosage on each machine is an advantage. It does not do away with the need of a dosimeter, but is a convenient method of getting fractional doses and of checking doses in practice.

5. The need for a standard dosimeter for the Commonwealth is obvious and the setting up of standards for each capital city would be a great advantage.

Deep X Ray Therapy with Higher Filtrations of Copper.

DR. LEILA KEATINGE (Sydney) reported results of deep X ray therapy treatment of 160 malignant growths with two millimetres of copper filtration. She pointed out that the series was small, that the results did not extend over a long period, that the patients treated were those who had not responded to any form of treatment and that she made no claims in regard to cure.

Of 35 patients with carcinoma of the cervix treated during the last 18 months, 25 were treated after the application of radium to the local lesion, 10 were treated after panhysterectomy. Ten patients were clinically well, in 16 the growth was arrested, in six it was progressing and three patients were dead. Two patients with recurrent carcinoma of the body of the uterus after panhysterectomy were clinically well. Two patients with sarcoma of the body of the uterus were clinically well. Thirty-three patients with carcinoma of the breast were subjected to irradiation; 20 of them had not been operated on, 12 had recurrent and secondary growths, one was treated after surgical operation. Only two of the patients with primary breast carcinoma had died; 12 were clinically well and in 21 the growth was arrested. She found that secondary deposits of breast cancer in bones responded much more quickly and effectively to radiation through the two millimetres filtration than they did with one millimetre of copper.

Dr. Keatinge gave figures showing the results obtained in cancers of other regions. She pointed out that the most intractable condition of all was carcinoma of the naso-pharynx, a complete failure being obtained in nearly every instance. She asked whether the more resistant growths were being attacked strenuously enough—whether they were using short enough wave lengths and high enough filtration. She said that she had started treatment in a new series of cases by using a filter of three millimetres copper. Already she had obtained satisfactory response from six sarcomata of the naso-pharynx.

Small and Large Milliampèrage.

DR. W. LOVE (Sydney) read a paper on small *versus* large milliampèrages.

Resaturation in the Radiation Treatment of Cancer.

DR. E. H. MOLESWORTH (Sydney) read a paper on resaturation in the radiation treatment of cancer. He pointed out that the massive dose method of radiation had been abandoned in both radium and X ray treatment of cancer. Saturation was then achieved by the long continued effect of small quantities of radium heavily filtered or by fractional doses of X rays repeated every two or three days through different ports of entry until the saturation dose was arrived at. At this point treatment was suspended for at least two months. If any cancer calls survived the single saturation recurrence was inevitable. The second growth being more resistant to radiation than the original, a second treatment only rarely succeeded in eradicating the disease. To minimize the risk of such a happening the method of resaturation had

been introduced. In this method the original dose obtained in the tumour was supplemented at intervals by doses calculated to make up for the fading of radiation during the interval. After the lapse of a fortnight it was known that 30% of the original effect was lost and this 30% might be safely reintroduced to the tumour after this time. The method was growing in favour in European clinics. It appeared that cancer cells, damaged but not actually killed by the first saturation, were less able to survive quick resaturation than they were able to tolerate the repetition of the original dose after an interval of two or three months. Resaturation was in most cases effected by X rays, whether the original dose was delivered by X rays or radium.

Dr. Molesworth illustrated the principles or resaturation by referring to radiation treatment of cancer of the *cervix uteri*. He had obtained encouraging results with the method, but sufficient time had not elapsed to enable him to say whether the results would be permanent. His object in drawing attention to the method was to stimulate others to use it and determine its value.

The Problem of the "Erythema Dose".

DR. A. T. NISBET (Sydney) read a paper entitled "Some Observations on the 'Erythema' Dose." He referred to the increasing popularity of deep X ray therapy and discussed the advantages of high kilovoltage and of higher filtration. The advantages of high kilovoltage were that shorter wave lengths were obtainable and that they were obtainable in greater quantity. Machines capable of working up to 600 kilovolts were being constructed and this seemed to show that workers in Europe were not satisfied that the voltage used was sufficiently high. The use of higher filtration meant that a deep-seated growth could be given a higher dose of radiation without there being any need to increase the number of the ports of entry. With the increased dose to the growth secondary radiation produced in the tissues was increased.

Dr. Nisbet then turned to the question of dosimeters. He referred to several kinds of dosimeter and pointed out that only by the use of measuring instruments could an operator be sure of giving a sufficient dose. After making reference to erythema and the use of different filtrations of copper, Dr. Nisbet said that they had, through experience of dosimeters and from knowledge of the degrees of erythema, reached the stage at which they could produce the exact reaction required through any given filter and repeat that reaction at any subsequent time. He thought that the Conference should appoint a dosage subcommittee and that one or more member of this committee should be sent with the necessary measuring instruments to the capital cities of Australia and should furnish a report on each deep X ray therapy machine in Australia.

X Ray Therapy.

Certain suggestions regarding X ray therapy were submitted to the Conference by the University of Sydney Cancer Research Committee. With one or two minor alterations, they were accepted as follows:

> This Conference recommends to all clinics the adoption of the following principles and standards:
>
> (*a*) That for the more accurate comparison of results of radiation treatment of malignant disease in the different deep X ray therapy centres in Australia, there be specified—
>
> 1. The nature of the disease according to the classification adopted by the Commonwealth Department of Health in connexion with radium treatment.
> 2. The types of machinery employed and the details of the technique.
> 3. The quantity and quality of the X radiation used.
> 4. The physiological skin reactions obtained.
> 5. The ultimate result of treatment.
>
> (*b*) That for these purposes an Australian standard and States substandards be prepared for calibrating the recording instruments in international *r* units, and that the Commonwealth Department of Health be asked to prepare these standards.
>
> (*c*) That dosages should be recorded in international *r* units.
>
> (*d*) That the quality of the radiation shall be specified, if possible, in terms of the half-absorption layer of copper.
>
> (*e*) That the type of machinery and the technique employed shall be recorded and especially whether constant potential or mechanically rectified. The records shall include also the peak voltage, the tube, the target, the target skin distance, the filtration, the size of the field, the ports of entry and the time of exposure.
>
> (*f*) That the physiological skin reactions to the radiations employed under the conditions set forth in (*e*) be stated in degrees according to the following tentative classification:
>
> *First degree*: Slight blush within seven to ten days. No further sequelæ.
>
> *Second degree*: Redness usually in five to seven days, disappearing in another five to seven days. Pigmentation more definite and slight flaking of surface epithelium on friction.
>
> *Third degree*: Intense redness in 24 to 48 hours followed by vesication in seven to 10 days, with subsequent marked desquamation, followed by strong pigmentation.
>
> (*g*) That uniform records be devised for the use of hospital deep X ray therapy departments and private practitioners in deep X ray therapy.
>
> (*h*) That the ultimate result of treatment be recorded upon the forms to be provided, and forwarded to the Commonwealth Department of Health.
>
> (*i*) That the details of subparagraphs (*c*), (*d*) and (*e*) of these recommendations shall be considered further by a committee consisting of Professor Laby, Dr. Eddy, Mr. Turner, Dr. Love and Mr. Wilkins.

The Clinical Aspect.

A series of papers dealing with the prophylactic and clinical aspect of malignant disease was presented. Dr. L. M. McKillop dealt with the preventive aspect of the cancer problem and with the treatment of cancer of the buccal cavity. Dr. E. H. Molesworth discussed the prevention of cancer of the skin and buccal cavity. Dr. J. V. Duhig dealt with cancer of the skin, and Dr. F. P. Sandes with radium and radon technique in skin cancer. Dr. B. Kilvington and Dr. I. B. Jose sent papers on cancer of the mouth. The use of radon in treatment was the subject of short communications by Dr. H. A. McCoy, Dr. N. T. Bull, Dr. Kaye Scott and Dr. J. M. Buchanan. Dr. A. J. Metcalfe sent a note on a family history of cancer, and Dr. A. A. Lendon a paper entitled "The Genesis of Cancer".

Several of these papers will be published in full in this journal in subsequent issues.

The Next Conference.

After some discussion, in which it was suggested that the next conference should be held in a State capital city, it was decided to hold the fourth Conference at Canberra.

Conclusion of the Conference.

The following motion was submitted to the Conference by Dr. F. S. Hone and carried:

> At the conclusion of its deliberations the Third Australian Cancer Conference desires to record its appreciation of the benefits that have already accrued the general public through the action of

the Commonwealth Department of Health in the distribution of radium and the standardization and coordination of radio-therapeutic efforts in the various centres. The discussions at the present Conference have revealed the marked advance in efficiency that has occurred during the past twelve months which will be increased by the distribution of the report of the proceedings of this Conference to the various centres concerned.

The Conference closed with a vote of thanks to Dr. J. H. L. Cumpston for having acted as Chairman.

Post-Graduate Work.

POST-GRADUATE COURSE IN SYDNEY.

A POST-GRADUATE course will be held in Sydney from May 30 to June 4, 1932. The fee for the course is £2 2s., and applications to attend should be made on or before May 20, 1932, to the Medical Secretary, New South Wales Branch, British Medical Association, British Medical Association House, 135, Macquarie Street, Sydney. The following syllabus has been issued:

Monday, May 30.

Sydney Hospital.—

9 a.m. to 9.30 a.m.—Registration: Honorary Medical Staff Room.

9.30 a.m. to 11 a.m.—Dr. H. J. Ritchie: "Heart Disease in Adults."

11.15 a.m. to 12.45 p.m.—Dr. H. S. Stacy: "Right-Sided Abdominal Pain."

2.15 p.m. to 3.30 p.m.—Dr. G. C. Willcocks, Dr. E. H. Stokes: Clinical demonstration in Out-Patient Department.

3.45 p.m. to 5 p.m.—Dr. H. S. Marsh, Dr. H. S. Kirkland: "Common Diseases of the Upper Respiratory Tract."

Royal Alexandra Hospital for Children—

8.15 p.m.—Subject: "Anterior Poliomyelitis Epidemic, 1931-1932.

Papers:

(1) The Medical Aspect, Dr. E. H. M. Stephen.
(2) The Surgical Aspect, Dr. R. B. Wade.
(3) Preparalytic Diagnosis, Dr. Karen Helms.
(4) Pathological Findings, Dr. F. Tidswell.
(5) Statistics, Dr. J. Steigrad.

Tuesday, May 31.

Royal Prince Alfred Hospital—

9.30 a.m. to 11 a.m.—Dr. C. B. Blackburn: "Diagnosis and Treatment of Common Renal Disorders."

11.15 a.m. to 12.45 p.m.—Dr. L. G. Teece: "The Use of Plaster of Paris."

Dr. E. B. M. Vance: "The Orthopædic Treatment of Poliomyelitis."

2.15 p.m. to 3.30 p.m.—Professor H. R. Dew: "Hydatids."

3.45 p.m. to 5 p.m.—Dr. E. H. Molesworth, Dr. A. L. Dawson: Skin Department.

Wednesday, June 1.

Saint Vincent's Hospital—

9.30 a.m. to 11 a.m.—Dr. V. M. Coppleson: "The Common Affections of the Anal and Perianal Region—the Diagnosis and Treatment."

11.15 a.m. to 12.45 p.m.—Dr. A. O. Diethelm: "Clinical Help in Diagnosis of Gastric Diseases."

Royal North Shore Hospital—

2.30 p.m. to 5 p.m.—Dr. Cotter Harvey, Dr. A. J. H. Stobo: Clinic for Pulmonary Diseases: Interesting chest cases.

Thursday, June 2.

The Women's Hospital, Crown Street—

9.30 a.m. to 11 a.m.—Dr. H. C. E. Donovan: "Obstetrical Emergencies in General Practice."

11.15 a.m. to 12.45 p.m.—Dr. A. J. Gibson: "Ante-Natal Methods."

Royal Alexandra Hospital for Children—

2.15 p.m. to 3.30 p.m.—Dr. W. A. Dunn, Dr. J. Sheddon Davis and Dr. H. G. Humphries: Enucleation of Tonsils—Sluder's Method.

3.45 p.m. to 5 p.m.—Dr. L. H. Hughes: "Chronic Infections of the Lung."

Dr. R. A. R. Green: "Some Cases of Rickets."

Friday, June 3.

Royal Hospital for Women, Paddington—

9.30 a.m. to 11 a.m.—Professor J. C. Windeyer: "Puerperal Sepsis."

11.15 a.m. to 12.45 p.m.—Dr. Constance D'Arcy: "The Toxæmias of Pregnancy."

Royal Alexandra Hospital for Children—

2.15 p.m. to 3.30 p.m.—Dr. R. B. Wade: "Diseases of Bones and Joints."

3.45 p.m. to 5 p.m.—Dr. M. J. Plomley: "Respiratory Disorders."

Saturday, June 4.

Tresillian Mothercraft Training School—

9.30 a.m. to 12 noon.—Dr. Margaret Harper, Dr. L. G. Tait: "Infant Feeding and Mothercraft."

Anterior Poliomyelitis.

In connexion with the Post-Graduate Course, Dr. Karen Helms (Infantile Paralysis Committee of New South Wales) will be pleased to demonstrate to country members the methods of examining the cerebro-spinal fluid for the diagnosis of acute poliomyelitis. Any country member desiring to attend such demonstration may arrange independently with Dr. Karen Helms to do so at a time convenient to both. Telephone: B 1537.

Obituary.

SIDNEY PLOWMAN.

WE regret to announce the death of Dr. Sidney Plowman, which occurred on April 27, 1932, at Frankston, Victoria.

JAMES AMESS.

WE regret to announce the death of Dr. James Amess, which occurred at Melbourne, Victoria, on May 1, 1932.

Correspondence.

OBSTETRICAL RADIOGRAPHY.

SIR: It is with amazement and astonishment that I have just read the letter of Dr. A. M. Davidson in your issue of the 16th instant.

With regard to the bogy of injury to the fœtus in X ray examination for diagnostic purposes, the absurdity of such was fully dealt with in a paper read at a meeting of the Obstetrical and Gynæcological Section of the Victorian Branch of the British Medical Association on May 27, 1926, and published in your journal on October 9, 1926.

It is bad enough for a general practitioner to belittle the value of X rays in obstetrical diagnosis, but it is quite inexcusable in one professing to be honorary obstetrician to a maternity hospital. The reference to the "worship of the test tube" is particularly objectionable, for much valuable information is available from the test tube, even where exhaustive examinations by other methods are also undertaken. So long as obstetricians and others will continue to neglect or belittle the value of X ray examinations, on the erroneous plea that "dependence upon judge-

ment and discrimination which can be developed only by unwearying attention to the minutest details of each individual case of child-birth, before, during and after delivery", so will serious and avoidable errors with disastrous results continue, although it is not denied that such care is still necessary despite X ray examination. The writer shows a confidence in clinical methods which is by no means always justified.

I do not purpose to discuss the criticism raised beyond saying that much of it is very unfair and certainly tends to retard the progress of what is certain to become a very valuable aid in obstetric practice.

Yours, etc.,
H. FLECKER.

Cairns,
North Queensland,
April 22, 1932.

Books Received.

SYNOPSIS OF MIDWIFERY AND GYNÆCOLOGY, by A. W. Bourne, M.A., M.B., B.Ch., F.R.C.S.; Fifth Edition; 1932. Bristol: John Wright and Sons, Limited. Crown 8vo., pp. 446, with illustrations. Price: 15s. net.

Diary for the Month.

MAY 17.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MAY 18.—Western Australian Branch, B.M.A.: Branch.
MAY 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MAY 25.—Victorian Branch, B.M.A.: Council.
MAY 26.—South Australian Branch, B.M.A.: Branch.
MAY 26.—New South Wales Branch, B.M.A.: Branch.
JUNE 1.—Western Australian Branch, B.M.A.: Council.
JUNE 1.—Victorian Branch, B.M.A.: Council.
JUNE 2.—South Australian Branch, B.M.A.: Council.
JUNE 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.

Medical Appointments.

Dr. B. H. Morris (B.M.A.), Dr. A. R. Southwood (B.M.A.) and Dr. W. Ray have been appointed Members of the Advisory Board of Censors to report to the Chief Secretary in connexion with entertainments under the provisions of *The Places of Public Entertainment Act*, 1913, South Australia.

* * *

Dr. F. C. McCredie (B.M.A.) has been appointed Government Medical Officer at Nabiac, New South Wales.

* * *

Dr. A. McKillop (B.M.A.) has been appointed Government Medical Officer at Temora, New South Wales.

* * *

Dr. G. H. Appel (B.M.A.) has been appointed Government Medical Officer at Moruya, New South Wales.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

CHILDREN'S HOSPITAL, CARLTON, VICTORIA: Medical Superintendent.
LAUNCESTON PUBLIC HOSPITAL, TASMANIA: Resident Medical Officer (male).
ROYAL HOSPITAL FOR WOMEN, SYDNEY, NEW SOUTH WALES: Resident Medical Officer.
THE WOMEN'S HOSPITAL, SYDNEY, NEW SOUTH WALES: Resident Medical Officer.
TIBOOBURRA DISTRICT HOSPITAL, TIBOOBURRA, NEW SOUTH WALES: Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Mount Isa Mines. Toowoomba Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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